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THE WORK OF BRITISH PATHOLOGY IN RELATION TO THE WAR.

BY

F. W. ANDREWES, M.D., F.R.S.,

PROFESSOR OF PATHOLOGY IN THE UNIVERSITY OF LONDON.

In forming any estimate of the work carried out by British pathologists during the past two years it is necessary to bear in mind the position of medical research in this country when the war broke out. The numerous and important medical and pathological discoveries which have had their birth in England have chiefly been the work of individual men, and have owed little to co-ordinated research, though admirable work was done in the laboratories of the different universities, of the Royal College of Physicians in Edinburgh, and in many other places. Up to the year 1913 the State did hardly anything to advance knowledge in medical science; a small sum doled out yearly by the Local Government Board and some assistance given by the Colonial Office to the Schools of Tropical Medicine represented almost all that was done, though it would be unjust to ignore the valuable research work carried out by the pathological staff of the Royal Army Medical Corps. Apart from the State, such endowed institutions as the Lister Institute and the Imperial Cancer Research Fund proved that as a race we were capable of sustained and not unfruitful effort on the lines of co-ordinated research where the opportunities for this existed. Nevertheless, individualism was the rule, and each pathologist tended to devote his energies to the research which happened to appeal to him whenever he had the necessary time and freedom from financial cares. Even under these conditions the output of good research work in medical science was by no means discreditable, and Englishmen have good reason for pride in the share which this country has taken in the advance of our knowledge of disease and of its treatment.

The Insurance Act, however, promised a revolution in research. For the first time the State set aside a considerable annual sum, between fifty and sixty thousand pounds a year, for the express purpose of advancing medical knowledge, and the Act organized machinery for its intelligent expenditure. The guiding hand was exercised by a body of nine persons, the Medical Research Committee, established in 1913, and carefully chosen from amongst those known to have the power of organizing research or distinguished in its prosecution. Much time and thought were expended by this committee in elaborating their schemes of action, but scarcely had the machinery begun to move when the war broke out and interrupted most of their projects.

A gigantic war, carried out under conditions largely new, necessarily presents a continuous series of new medical, surgical, and pathological problems requiring immediate solution. It was a fortunate thing for the country that the Army Medical Service was well organized and efficient. Many of the problems which would confront us had been foreseen and their solution thought out. In particular the pathological branch of the service was well developed and excellently officered by a staff trained in the well-equipped laboratories of the Royal Army Medical College. At the onset of the war, however, the Army Medical Service found itself more than fully occupied with the necessary administrative duties which it was called upon to fulfil, so that it was impossible for its staff to deal at once with all the new questions which arose. It was now that the Medical Research Committee proved its value. It was already a "going concern," and was in a position to divert the energies which were to have been expended on research into the medical problems of a country at peace to the solution of those which arose in consequence of war. The committee therefore placed itself at the disposal of the nation, and especially at the service of the military authorities; its flexible organization enabled it to attack new problems at short notice and with maximum effect, and the value of the results which have been attained under its auspices has been in many cases immediate and remarkable, as will appear in the following pages. It will be convenient to group the chief pathological problems which have been met during the war and discuss them seriatim.

The Control of Enteric Fever.

Enteric fever, the great medical scourge of all former wars, has been reduced in this, the greatest of all wars, to insignificant proportions. Two factors have contributed to this: one was a knowledge of the "carrier" danger, which was met from the outset by the bacteriological examination of all suspected persons and their prompt segregation; the other and more important factor was prophylactic inoculation. The practice of inoculation against typhoid fever, which we owe to Sir Almroth Wright, had been tried on a small and inadequate scale in the South African war, with not wholly convincing results. It had since proved its worth in our Indian army, and the most effective methods for securing protection had been worked out in detail by the pathologists of the R.A.M.C. under Colonel Sir W. B. Leishman. The methods devised were put into practice from the beginning of the war, and in the course of a few months practically the whole army was inoculated. Small local outbreaks of enteric were promptly suppressed, and the total number of cases was extremely small in comparison with what might have been anticipated. The inoculation, however, was carried out with vaccines of *B. typhosus* alone, and the protection afforded against infection with *B. paratyphosus* (A and B) was not of high degree. During the first year of the war actually more paratyphoid than typhoid was observed amongst our troops. As the result of this experience the War Office appointed a small committee of pathologists to consider the advisability of including paratyphoid bacilli in the prophylactic inoculation. The question of dosage was carefully considered, and groups of men were experimentally inoculated with the mixed vaccine to make sure that the constitutional reaction was not too severe. The tests were satisfactory, and from the beginning of 1916 the new triple vaccine, known as T.A.B., has been the sole official vaccine for the British army, and has proved itself efficient in controlling paratyphoid as well as typhoid fever.

The pathological diagnosis of enteric fever has been complicated by the fact that practically all soldiers were inoculated men, so that the old methods of serum diagnosis became untrustworthy. At an early period of the war Professor Dreyer of Oxford drew attention to the method of carrying out agglutination reactions macroscopically with standardized killed cultures, which he had elaborated in Copenhagen some years previously. The advocacy of this method by Professor Dreyer and his colleague, Dr. Ainley Walker, led to its widespread use, and its accuracy proved such that a diagnosis could be made even in triply-inoculated men, provided that two or three observations were made at intervals of a few days, so as to follow the agglutination titres of the blood against the three bacilli respectively. The Medical Research Committee took the matter up and established at Oxford a laboratory from which standardized emulsions together with the requisite outfit for carrying out the test have been supplied free to all military pathologists, Dreyer's technique being now used almost universally. Much valuable information about the course and diagnosis of the different forms of enteric fever has resulted from the widespread use of this standard method, which has the advantage that the observations of different workers are strictly comparable.

That the freedom from enteric which has been enjoyed by our armies on the Western front is due to the care taken in ensuring inoculation, and to the sanitary precautions which have been enforced, is shown by the condition of affairs where this care was impossible and inoculation incomplete, notably in the Gallipoli expedition. Here, although there was little typhoid, the amount of paratyphoid was by no means inconsiderable, but exact figures are wanting owing to the lack of facilities for diagnosis.

Dysentery.

Of this second great medical scourge of war a less favourable tale can be told, inasmuch as no specific preventive measures have yet been devised. It has not been found practicable to employ prophylactic inoculation against bacillary dysentery, chiefly on account of the high toxicity of Shiga's bacillus, though research work on this subject is in progress, and mention may be made of the method of reducing this toxicity by the action of hypochlorites, as suggested by Professor Dean of Manchester. Prevention has therefore been reduced to hygienic precautions and to

the search for carriers, and on the Western front these measures have hitherto sufficed to prevent any serious outbreak of dysentery, in spite of the return to France of large bodies of troops from the Mediterranean area. In the Eastern Mediterranean, and in Mesopotamia, dysentery has prevailed largely, both amoebic and bacillary, and has offered an opportunity for careful study, particularly in the cases returning home to this country. In the autumn of 1915 an immense number of cases of the disease returned home from the Mediterranean area, and, in order to avoid any risk of spread, were concentrated by the War Office in certain centres scattered over England. The Medical Research Committee provided laboratory assistance at these centres and were able to organize courses of instruction in protozoology for the numerous workers who were comparatively unversed in that subject. In the London district over a thousand cases were studied in full detail, and the facts which have been collected will afford a mine of valuable information on dysentery and allied diseases. Some of the work has already been published by the Medical Research Committee, namely, Dobell's report on amoebic dysentery, and that by the workers at the London Hospital on the investigation of 878 cases of bacillary enteritis from the Eastern Mediterranean. No such opportunity has ever occurred for the study of the tropical forms of dysentery in England, and many new facts have been brought to light.

The value of emetine in the treatment of amoebic dysentery has been abundantly confirmed, and Dr. Dale has introduced the double iodide of bismuth and emetine for the treatment of amoebic carriers, upon whom it has been used with successful results. Dr. Dale has also shown that the persistent administration of emetine may lead to symptoms not unlike those of the dysentery it is designed to cure.

Cerebro-spinal Fever.

Although this fever has been present amongst the British forces on the Western front, anxiety has chiefly been felt about the troops in training in England. For the first time the disease has prevailed epidemically over the whole of this country, affecting equally the civil and military populations. Strenuous efforts have been made by the War Office to control its spread, and invaluable assistance has been furnished by the Medical Research Committee in the provision and equipment of bacteriological laboratories for the purpose. Lieut.-Colonel M. H. Gordon was placed in control of the scientific work, and he organized laboratories for the diagnosis and study of cerebro-spinal fever at numerous centres throughout the country, while he himself and his immediate staff carried out research work at the Central Laboratory at Millbank. The outcome of Lieutenant-Colonel Gordon's researches promises a distinct advance in our methods of combating the spread of the disease. New, cheap, and easily prepared media for the growth of the meningococcus have been devised. A serological study of the races of this organism concerned in the epidemic has been carried out, with the result that the chief epidemic strains have been determined and a simple means for their diagnosis by agglutination placed within the reach of all pathologists. The importance of these observations is twofold. The value of a curative serum in cerebro-spinal fever depends upon whether the particular epidemic strain concerned in a given case of the disease has been employed in producing the serum. The serum available at the beginning of the epidemic, largely American in origin, was found of little value in treatment, but that prepared during 1915 from a due admixture of current epidemic strains proved of considerable curative potency. In the second place, the problem of the segregation of carriers of the meningococcus is simplified. So numerous may such carriers be at certain times that their isolation is almost impracticable. Gordon therefore proposed the isolation of those carriers only who bore epidemic strains of the meningococcus. Although certain risks may be run by such limitation, it has the merit of reducing the numbers to be isolated within practicable limits, and it has been found possible to carry out this policy, at least in a military population, with satisfactory results as regards the spread of the disease, for the more dangerous carriers have been eliminated. Another useful research carried out by Lieutenant-Colonel Gordon has been in relation to the cure of chronic carriers: by causing them to breathe for a short time every day the air of a room saturated with a fine spray containing chloramine-T he found it possible to cure the majority, though not all, of such carriers within a fortnight; a special spraying apparatus has been devised for this purpose. It may be added that valuable work on the races of the meningococcus has been carried out in military laboratories in France by Arkwright and by Ellis; and, further, that a very thorough study of the same subject amongst the civil population has been going on for two years in the laboratories of the Local Government Board by Drs. Eastwood, F. Griffith, and Scott.

Other Medical Diseases Incident on Trench Warfare.

The conditions under which the troops have fought for the past two years have been associated with the appearance of epidemic diseases some of which have been known before while others have previously escaped recognition. The chief work on diseases of this character has necessarily been carried on at the front, where they are encountered in the acute stage; their clinical features have been defined by the work of the physicians and their etiology studied by pathologists at the base hospitals. Lack of space prevents our doing much more than to allude to them here, and indeed so much remains to be found out concerning most of them that few positive assertions can be made.

Trench nephritis has been exceedingly prevalent, and its course and symptomatology are now familiar, but we have failed to discover the exciting cause in spite of a large amount of work both in France and in England. The balance of evidence is in favour of the view that it is an infective malady, but no definite microbe is demonstrable, and efforts to transmit the disease to animals have so far proved unsuccessful. A very complete clinical study of this form of nephritis has been made by Captain Langdon Brown at St. Bartholomew's Hospital, so far as concerns the stages at which cases reach England, while the chemical pathology of the urine has been elaborately investigated by Captain Mackenzie Wallis. Two meetings have been held for the discussion of the disease, one at the Royal Society of Medicine and one at the Medical Society of London. At the last of these meetings Lieutenant Dunn showed a valuable series of histological preparations which he had made from recent cases in France.

Trench fever is a novel disease which received this name towards the end of 1915, when Captain Hunt and Major A. C. Rankin published an account of thirty cases. It appears to be distinct from any fever hitherto recognized, and, according to Captain McNee and Lieutenant Renshaw, who published a careful account of it in April, 1916, it assumes two forms, the second being the relapsing variety. The two latter observers were able to reproduce the disease in man by injecting the blood from active cases into volunteers for the experiment, and they further showed that the infecting property resided in the corpuscles and not in the serum. Nevertheless, they were unable to demonstrate any visible parasite in the blood, and the natural mode in which the disease is conveyed is still a matter of conjecture. Captains Davies and Weldon have, however, in one case reproduced the disease in man through the intermediation of the louse.

Infective jaundice, often known as "Weil's disease," has been of not infrequent occurrence in France, as well as in the Mediterranean area, and the infecting agent—*Spirochaeta icterohaemorrhagiae*—has been repeatedly demonstrated. *Cholera* and *typhus fever* have fortunately been conspicuous by their absence among the British forces, but admirable work was done in the control of typhus by the British hospital units in Serbia, chiefly by eliminating lice.

The Study and Treatment of Wound Infections.

This subject has naturally occupied a foremost position in the present war. The majority of modern surgeons, trained in the aseptic school, found themselves confronted by totally novel problems in the vast numbers of severe wounds, grossly contaminated by faecal bacteria, including the most dangerous anaërobes. From the first, both surgeons and pathologists set themselves to work to overcome difficulties which had never before been presented in bulk since the rise of aseptic surgery. And almost from the first two schools of treatment arose, the one condemning the use of antiseptics as a means of purging a wound of its bacteria and trusting in "physiological methods" of treatment, the other advocating germicides of one sort or another.

The apostle of physiological methods was Colonel Sir Almroth E. Wright, the chief of the Bacteriological Department of the Medical Research Committee, who was liberated for service as a consultant at the front. He occupied a pathological laboratory at Boulogne, and commenced, with the assistance of a number of fellow-workers, mostly his own trained pupils, a laborious investigation of the conditions obtaining in wounds from the point of view of pathological physiology. Whatever view may be held as to the best treatment for infected wounds, which, for the surgeon, is a matter of practical experience, it must be admitted on all hands that the study carried out by Colonel Sir Almroth Wright and his colleagues at Boulogne was a brilliant and suggestive piece of work. Various new technical methods were devised for this study, the outcome of which has been published in detail. From a surgical point of view the methods of treatment to which it gave rise consisted essentially in the encouragement of a free flow of lymph into the wound, for which purpose hypertonic salt solutions were chiefly employed. Pursued to its most extreme degree, this method developed into the packing of septic wounds with tablets of solid salt, with or without the addition of sodium citrate; such treatment was, of course, temporary, the amount of salt used being reduced after a few days. Excellent results have been recorded by those who have employed this mode of treatment in selected cases. Sir Almroth Wright has devoted much attention to the problem of the continuous irrigation of wounds with saline solutions, and has devised methods by which very successful results have been achieved.

On the other hand, a vast amount of work on antiseptics in their application to wound surgery has been carried out by pathologists and surgeons both in England and at the front. The crude attempts at sterilizing wounds by single applications of such powerful germicides as carbolic acid have been largely abandoned, though applications of a mixture of equal parts of pure carbolic and camphor have proved useful in cases where the nature of the wound permits. The most successful results, however, have been obtained through researches into the properties of the hypochlorites. Two separate sets of researches on these lines have been supported by the Medical Research Committee and have proved fruitful, and largely identical in their practical outcome. Working in Edinburgh, Professor Lorrain Smith, with the aid of three colleagues, devised a combination of bleaching powder and calcium borate which proved exceedingly efficacious in the treatment of septic wounds; they published formulae for a solution which they termed "eusol," and a powder, "eupad," which have now been extensively used, and with marked success. Quite independently, Dr. Dakin, working at Compiègne, produced a very similar solution, equally successful in its application. On the surgical side he became associated with Dr. Carrel, and the collaboration of these two workers, who have introduced a special technique for the continuous irrigation of wounds with the hypochlorous solution, has issued in a method of wound treatment which has led to marvellous results, under which, when the bacterial flora of a wound has been lowered to a certain defined point, it is safe to perform secondary closure and suture. This method of treatment, which does not conflict with that by hypertonic saline, has become increasingly popular amongst surgeons at the front, and, in the judgement of many, is the most efficient method yet introduced for dealing with septic wounds.

Dr. Dakin's researches did not end with the introduction of the hypochlorous solution, for he proceeded later, in conjunction with Professor Cohen of Leeds, to study its mode of action in the presence of proteins. It was found that the hypochlorous acid acted, not, as formerly supposed, as an oxidizing agent, but by the formation of chloramines. Amongst the chloramines whose properties were investigated were found several of considerable disinfectant power, and one of them—toluene-sodium sulphochloramide—has been introduced into medical and surgical practice on a commercial scale under the name of chloramine-T. This substance, though of fairly high germicidal value, is almost non-toxic, and has no action on albumin. It has thus been found of special value in dealing with wounds involving the mouth, and it has proved the most efficient drug, when atomized by a steam spray, in ridding chronic meningococcus carriers of their infection. It is, further, absorbed in notable amount by textiles, and chloramine gauze has been found to possess a much higher germicidal value than any other antiseptic gauze previously in use. Incidentally, Dr. Dakin found chloramine-T a useful reagent in the study of the chemistry of proteins, and he has been able to form cyanides from amino-acids.

Another important application of the hypochlorites has lain in the disinfection of hospital ships. The crowding of large numbers of cases, many of them suffering or convalescent from enteric fever or dysentery, in these vessels led to a good deal of secondary infection during the voyage. The process of generating hypochlorites by the electrolysis of sea water has long been known, and Dr. Dakin devised a simple plant for this purpose, using the ordinary ship's current. This was installed experimentally on the *Aquitania*, and gave such admirable results that the method is now widely employed. One of the advantages presented by the hypochlorites as disinfectants is their extreme cheapness: the saving in carbolic acid and cresol in one voyage of the *Aquitania* was estimated to exceed the cost of the electrolytic cell and its upkeep, and the efficiency of the disinfectant produced was so great as practically to abolish cases of secondary infection.

One other disinfectant introduced during the war which deserves special mention is flavine, now termed "acriflavine." This substance, originally prepared by Benda at Ehrlich's suggestion, for the treatment of trypanosomiasis, had never been subject to proper study as a bactericide. This study was undertaken for the Medical Research Committee at the Middlesex Hospital, by Dr. Carl Browning and several of his colleagues. The research included a number of acridine compounds besides flavine, and embraced also brilliant green and aniline dyes, but the properties of flavine place it almost apart from other germicides. Nearly all the chemical substances which destroy bacteria are inimical also to living tissue cells, and impair the phagocytic functions of the leucocytes. Flavine, according to Dr. Browning's report, is largely free from these objections; that is to say, it is effective as a germicide in dilutions which are harmless to the tissues, and do not impair the phagocytic powers of leucocytes. More than this, almost all other disinfectants are subject to the grave disadvantage that their activity is hindered or even abolished in presence of albumins; it is claimed for flavine that it is a more active germicide in serum than in distilled water. The clinical trials of flavine at the Middlesex Hospital appear to support these laboratory investigations, but at the moment the stock of flavine available is not sufficient for wider trials, though its commercial production has been begun.

It need hardly be said that the opportunities for studying the bacteriology of septic wounds which have so freely offered themselves have led to a large amount of research work, the most important, because the most novel, part of which has been the study of anaërobic infections. The universality of such infections has attracted attention to them in almost every pathological laboratory, and the opportunities for investigating gas gangrene in the base hospitals in France have been well utilized, though the results have, perhaps, been of surgical rather than pathological novelty. An important observation is that of Dr. Dale, who has brought forward evidence that the so-called "toxins" of certain of the anaërobic bacilli connected with gas gangrene are really salts of ammonia. Specific studies of the anaërobic infections of wounds have been carried out for the Medical Research Committee by several groups of observers in this country, notably by Drs. McIntosh and Fildes at the London Hospital, and by Professor Dean at Manchester; while at the Lister Institute Miss Robertson has been similarly occupied. Our knowledge of the classification and characters of these bacilli has gained much in precision and extent.

Tetanus.

In the early days of the war tetanus of a severe type was common amongst the wounded, and the control of this disease by the prompt administration of a prophylactic dose of antitoxic serum to all wounded men will rank as one of the triumphs of preventive medicine in the present war. Early in 1916 the War Office appointed a Committee for the Study of Tetanus under the chairmanship of Surgeon-General Sir David Bruce, C.B., F.R.S. This Committee has met at short intervals, and being furnished with the data as to all cases occurring in military hospitals

in England, is accomplishing good work in connexion with prophylaxis and treatment, to which the appointment of tetanus inspectors in all the different military commands has been of assistance. The practice of prophylactic inoculation has not only greatly diminished the incidence of tetanus, but in large numbers of cases has profoundly modified its nature and course when it does occur. The recognition of "local tetanus" as opposed to the generalized disease was first made by French observers as a phenomenon of partial protection, and their observations have been fully confirmed by the occurrence of similar cases in this country and amongst our wounded abroad. Every gradation has been observed between a tetanus strictly limited to the wounded limb and the general disease, and it has been found that the more localized the tetanus the better is the prognosis. With regard to the treatment of declared tetanus there is still considerable dispute as to the best route for administering the specific antitoxin. The War Office Committee has from the first advocated the intrathecal route, and has instigated experimental work relating to this matter, which is not yet sufficiently advanced for publication.

The Life-History of Bilharzia.

The presence in Egypt of large numbers of Imperial Forces was attended by grave risks of the outbreak amongst them of certain of the endemic diseases of that country, and not the least of these was infection by bilharzia. The complete life-history of this parasite was unknown, and had baffled Looss and other investigators, so that there was no knowledge of the special precautions that ought to be taken. In these circumstances the Medical Research Committee co-operated with the War Office and the London School of Tropical Medicine in sending out a special mission, headed by Dr. Leiper, to study the subject. This mission successfully solved, in a few months' work, the main problem involved, proving that the intermediate host of the worm is a fresh-water mollusc; and further work during 1916 has shown that the two main species of bilharzia in Egypt have distinct intermediate hosts: that of *Bilharzia mansoni* being *Planorbis boissyi*, while *Bilharzia haematobium* has two, and perhaps three, species of *Bullinus* (*B. contortus*, *B. dybowskyi*, and probably *B. innesi*) as intermediate hosts. Cheap and efficient means have been found for rendering infected waters safe, and have been brought into use in all military camps. For the first time the way is opened up for the eradication of this grievous infection from the country, a result all the more earnestly to be desired, since no means of destroying the worm has been found when once it has established itself in the human body.

Trench Foot.

Very large numbers of men were invalided from the Western front during the winter of 1914–15 with the condition at first regarded as frost-bite, but now commonly termed "trench foot." Professor Delépine investigated this subject at Manchester, while Professors Lorrain Smith and Ritchie with Dr. Dawson carried on a research for the Medical Research Committee at Edinburgh. It has been shown that "trench foot" is a minor state of frost-bite, the damage inflicted being usually short of immediate death of the tissues. The experimental work of Lorrain Smith and his colleagues upon the rabbit shows that the primary lesion is vascular, with a secondary inflammatory reaction when the subject is removed from the causal environment. The difference between this and true frost-bite is one of degree only, and the severer forms of trench foot end in gangrene. Professor Delépine has shown the importance of a layer of air surrounding the lower extremity in preventing trench foot, and has devised a simple and light bag of oiled silk which can be worn by those exposed to continuous wet and cold in the trenches, and which has proved a considerable safeguard.

The foregoing short account of what has been accomplished during the war by British pathologists is necessarily incomplete. Much that has been done may not yet be written about, and no attempt has been made to enter into full details as to that which is already public property. This slight sketch of some of the more important work which has been accomplished will suffice to show that in pathology, no less than in the other sciences, advances have been made, under the stress of national necessity, during the two years and a half of war which could hardly have been expected in twenty years of ordinary work; and although it has been "war work," it represents a solid contribution to science which will be valid for the years of peace to come.

BACTERIOLOGY AT THE FRONT.

BY

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BACTERIOLOGICAL investigation in hospitals of the front line has been a novel feature of this war. Nothing of the kind has been practised in any of our previous campaigns. It has been rendered possible by equipping motor vans as mobile laboratories. The first, which was sent out in October, 1914, had been a pleasure caravan. It was gutted and fitted with incubators and all the other apparatus of bacteriological work, and was followed by many others of the same type. They have been attached to a clearing station or a group of clearing stations, and the officer in charge is provided with a small motor car, so that he can go to any place in his area where his services may be wanted.

These officers perform three functions:

1. They examine all kinds of morbid products from the hospital wards, and thus aid in the diagnosis of enteric fevers and other epidemic diseases on the medical side, and of the various forms of infection that attack surgical wounds.

2. They examine contacts in cases of infectious fever and search for carriers both among the troops and in the civil population.

3. They investigate new forms of disease that appear among the troops in order to discover their causes and the means of prevention.

Instances of the first class of work are the examinations made of the blood and excreta in cases suspected of enteric fever, of malaria, or of dysentery, and of the cerebro-spinal fluid, or the nasal mucus where cerebro-spinal fever is in question.

In the first year of the war the diagnosis of enteric at the front was comparatively easy. But when, in January, 1916, the triple inoculation against typhoid and paratyphoid A and B came into use, it became much more difficult. Firstly, the culture of the bacilli from the blood is very uncertain in inoculated men after the first three days of fever, and, since the early symptoms are slight and are not distinguishable from those of many other fevers that prevail, few patients arrive at a clearing station within that time. Secondly, the triple inoculation so complicates the agglutination test that it is only after three or four trials and a comparison of the results that a conclusion can be reached. As this takes twelve or fourteen days it is only carried out at the front in the comparatively few cases that are retained in the infectious hospitals there, nor is it, even with the repeated examination of the excreta in addition, always possible to obtain bacteriological evidence in cases where the clinical symptoms render the diagnosis certain.

In the case of cerebro-spinal fever, Captain Ellis, of the Canadian Mobile Field Laboratory, established at the same time as Lieutenant-Colonel Mervyn Gordon at home the existence of different types of the meningococcus distinguishable by agglutination and absorption tests.

During 1915 cases were also observed in which, with acute symptoms just like those of cerebro-spinal fever, the cerebro-spinal fluid, though under high pressure, contained no polymorphs and no meningococci, but lymphocytes in excess. This condition we called lymphocytic meningitis. It was never fatal. Later on several cases of meningococcal septicaemia, which is a very acute and rapidly fatal disease, were discovered by the bacteriologists.

Certain cases of dysentery occurred and were accompanied by a considerable amount of non-dysenteric diarrhoea. A large amount of diagnostic work was carried out by the mobile laboratories of this area.

The next function of these officers is to discover the source of an infection, and to stop it from spreading. In cases of enteric the work was very elaborate. In the first place, a systematic search was made for recent or chronic

carriers among the troops. Thus, in one regiment a carrier was discovered in the regimental kitchen. In another, which had lately received reinforcements, no less than 96 men had to be examined before the carrier was found. But the source of infection was not always in the troops. The part of Flanders that we held was a hotbed of enteric, and many cases were found in the civil population. The search for these, in which the bacteriologists were aided by the Belgian sanitary officer, Dr. de Wulf, and also by the Society of Friends, was very difficult. In one village cases of enteric occurred in three successive formations that were billeted there. No civil cases could be traced, until news was brought of a child that had been sent away to convalesce at a neighbouring farm. The clue was followed, and the family to which the child belonged were identified as the source of the outbreak. They kept an estaminet, and sold food to the soldiers. Many carriers of dysentery have also been discovered and isolated.

The conditions of warfare made it far less possible to obtain contacts of cerebro-spinal fever at the front where men are constantly moving, than it is at home where a man may be stationary for weeks.

The subject is extremely difficult, and even now the method of diagnosis that satisfies one bacteriologist is held insufficient by another. I do not remember any instance in which we could connect two cases of the fever as cause and effect, or as caused by the same infection. They have been very uncommon, even under the conditions at home.

As instances of the examination of new or little known forms of disease, I may mention trench fever,[1] investigated by Captain McNee; spirochaetal fever,[2] by Captain Adrian Stokes; gas gangrene;[3] and the histology of the prevalent nephritis, by Lieutenant Dunn.[4]

As these researches will no doubt be dealt with under their separate headings, it needs only to refer to them here as examples of excellent work done in the laboratories of the front and of the importance of this organization.

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TRENCH FEVER AND ITS ALLIES.

BY

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IN the first winter of the war there were many cases of stiffness and pain in various parts, especially in the muscles of the back and shoulders, with some fever, and there were also a few cases which were thought to be influenza, but in the spring of 1915 our attention was drawn to the frequency of a form of fever which struck every one as novel. The men were often seized suddenly, perhaps when performing a duty, with a vertigo or faintness so severe as to drop them in their tracks. A severe headache, especially at the back of the eyes, and a pain in the back began almost at once. Occasionally there was pain in the left hypochondrium. When the men reached the clearing station they complained of much pain in the legs, especially down the shins. Many could not bear the pressure of the bedclothes. In some the pain was rather in the muscles of the thigh, and in a few it was felt in the calf. Along with these symptoms the tongue was furred, the appetite bad, nausea was not infrequent, and the bowels were constipated. There was no cough, and the lungs were unaffected. The pulse was from 70 to 80, and the heart was natural. The spleen was not enlarged, and there was no albuminuria. The temperature rose quickly, reaching 102° F. or more on the second day. Occasionally the temperature rose to 105° F., and was accompanied by stupor. It fell on the third and fourth to normal, and then in many cases rose again on the fifth or sixth day, to fall again on the ninth or tenth. This saddle-backed curve resembled that of the phlebotomus fever of the Mediterranean, and the symptoms were not dissimilar, though milder, but there was no phlebotomus in this country.[1] [2]

As further cases were observed, it was discovered that the relapse might take place at different intervals, even after ten days of a normal temperature, but that for each patient the cycle was regular. Thus in one patient the cycle might be seven days, in another ten, and in another even thirteen days. The periods of normal temperature lasted five, eight, and eleven days respectively, and were interrupted by a sudden fever, which might rise to 104° F. and as quickly disappear. As the disease continued the fever rose each time to a gradually lower level, and the intervals might become longer.[3]

In a large number of cases there was only one bout of fever. Many had only one relapse, but if there was more than one there were frequently many, and such a patient might continue ill for many weeks.

Such charts as these, with a sharp and sudden rise, separated by regular and afebrile periods, were strongly suggestive of the life-cycle of some blood parasite, and every method was followed which gave hope of its discovery. Up to the present no such body has been found, but it has been shown that the fever can be communicated by the blood from a patient if injected into a healthy man, and, further, that the virus is connected with the red blood cells and not with the serum. It has been a common opinion that whatever the virus may be it is conveyed by the louse, and there are a few facts to support this.[4]

No case proved fatal, and the great majority made a speedy recovery, but some were left with irregularity of the heart, which persisted for a long time. Cases of recurrence after intervals of good health were not unknown; it was evident that one attack did not produce immunity.

Many drugs—including the salicylic acid compounds, and quinine by the mouth, and salvarsan, and antimony by injections—were tried. None had any effect upon the course of the fever. In a few cases aspirin, and in more morphine, relieved the pain temporarily.

Along with this relapsing form, which was called trench fever, there were others which showed no relapse, though the symptoms were the same. Some of them had a hog-backed curve, the highest points lying towards the middle of the curve, which fell to normal about the tenth day. Others had a low pyrexia, never rising much above 100° F., but lasting a fortnight or three weeks. In the summer of 1916 a number of cases of short fever were seen in which the spleen was enlarged. These cases were occasionally observed at other times. They were probably a special form.

Some thought that they could distinguish a special type which they called shin fever, but this could not, on wider investigation, be established. It should be added that pain in the shins was not peculiar to any fever. It was seen in typical cases of enteric.

Some bacteriologists found various infections in the blood of these cases, but their results were not confirmed.

The chief diseases from which these fevers had to be distinguished were one of the enteric fevers and influenza. It was not until repeated examinations, extending over some hundreds of cases, had been made that we felt justified in excluding the former. Influenza is so protean a disorder that its exclusion was still more difficult. There were in these fevers, however, no catarrhal symptoms, the *B. influenzae* was never found in the blood, and the cases occurred only at the front or among the personnel of hospitals where the cases were treated. It was not a general epidemic as influenza usually is.

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BIOCHEMISTRY AND WAR PROBLEMS.

BY

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THE application of science to every department of modern warfare is universally appreciated. Without the co-operation of the engineer, the physicist, and the chemist, warfare could not approach its present destructive character. But, apart from these activities, the importance of which can hardly be over-estimated, a large amount of purely scientific endeavour has been devoted to the conservation of the health of those taking an active part in the present struggle. The object of the following notes is to indicate

a few striking examples of what may be termed constructive applications of biochemistry.

Purification of Water.

The supplying of a large army in the field with safe and palatable drinking water is obviously a problem of immense practical importance. The difficulties encountered, particularly when troops are living in typhoid-infected areas, were great, but the sanitary service of the army has every reason to feel proud of the great success it has achieved in this direction. The use of chlorine compounds for the sterilization of polluted waters has long been practised, particularly in typhoid-infected areas in America, but the application of the method on a huge scale to field conditions required additional experience and experiment. The care bestowed in the control of the army water supplies by both chemical and bacteriological methods has been fully justified by the results, and if the publication of statistics were permitted, it would appear that some other nations had still much to learn in this direction. While the excellent typhoid statistics of the British army are doubtless in large measure due to protective inoculation, the efficient supplementing of this procedure by the provision of safe water supplies is no inconsiderable factor.

Accessory Food Factors (Vitamines).

Questions of diet are of no less importance than water supply. In recent years biochemical studies have indicated the necessity of the presence of certain substances in relatively small amounts in order to make an otherwise ample diet adequate for maintenance or growth. The earliest experiments of this kind were made at Cambridge by Professor Hopkins and Miss Wilcox. They found that mice furnished with a diet containing liberal amounts of fat, carbohydrate, and protein, which were much more than sufficient to furnish the energy requirements of the organism, failed to sustain life if a particular amino-acid, discovered by Hopkins, was not a constituent of the protein. This heterocyclic amino-acid, tryptophane, systematically named indole α-aminopropionic acid, was found as a constituent of many proteins, but not all. It is absent, for example, from gelatine, this being one reason why gelatine is an incomplete protein food. Hopkins and Wilcox found that addition of small amounts of tryptophane to the inadequate diet just referred to was followed by marked improvement in the condition and duration of life of experimental animals. A most valuable discussion on the importance of individual amino-acid groupings in proteins for nutrition and growth has recently been published by Hopkins in his lecture at the Chemical Society, May 18th, 1916.[1]

Later experiments showed that young animals could not grow when fed upon so-called "synthetic" diets consisting of mixtures of pure proteins, fats, carbohydrates, and salts, although maintenance might be secured for a considerable time. But Hopkins[2] found that a substance or substances found in normal foodstuffs (for example, milk) can, when added to the dietary in astonishingly small amounts, secure the utilization for growth of the protein and energy contained in such artificial mixtures. The significance of these observations with regard to diseases such as scurvy, rickets, and beri-beri was at once apparent.

Late work by Hopkins, and a host of followers, has served to emphasize the importance for nutrition and growth of these small amounts of substances which are often called "accessory factors" or "vitamines." Some of the subtances which are found in milk, yeast, whole rice meal, and animal tissues, are extraordinarily potent in the relief of polyneuritis induced experimentally in birds by feeding on a "vitamine"-free diet of polished rice. The exact nature of these substances is still obscure, although Funk,[3] working at the Lister Institute, Suzuki in Japan,[4] Moore and co-workers,[5] Cooper,[6] and others, in England, have obtained partly purified basic products of high potency. The practical importance of these studies has been amply justified by the success obtained in the prevention of scurvy, beri-beri, and similar nutritional disorders among troops operating under conditions which render the abundant supply of fresh food difficult or impossible. By supplementing the diet available under such circumstances with small amounts of material rich in "vitamines," it has been possible to restrict the development of the disorders mentioned in a way that would have been impossible even a few years ago. A large number of experiments as to the most practical form of supplying the needed vitamines has been carried out under the direction of the authorities concerned, who were keenly alive to practical lessons to be learnt from the laboratory studies just referred to.

It is of interest to note that some recent experiments of Williams[7] upon the curative action of various substances on experimentally induced polyneuritis in birds appear to show that certain synthetic pyridine derivatives containing a betaine-like ring possess this property in high degree. A substance intimately related to the purin compound adenine has been isolated from yeast, and also found to exert curative action. The necessity for purin derivatives for the synthesis of nuclear substance *in vivo* is noteworthy in this connexion. It may reasonably be expected that the more intimate analysis of metabolic processes which is being made possible by the pioneer work of Hopkins will find many applications in the treatment and prevention of nutritional disorders.

Wound Infections.

Few subjects have attracted more urgent attention during the present war than the question of the treatment of infected wounds. As every one knows, this problem has surpassed in difficulty anything which had previously been experienced, both as regards the frequency and malignity of wound infections. Apart from special surgical procedure and protective inoculation, with which we are not concerned at the moment, the problem has been chiefly attacked in two ways.

Hypertonic Salt Solutions.

The method advocated by Sir Almroth Wright demands the employment of salt solutions of varying concentration but of slight germicidal action. Hypertonic salt solutions are used to provoke an increased flow of lymph from the wound surfaces with the object of facilitating and accelerating the natural processes of repair. The other methods which are in vogue involve the use of more active chemical agents—antiseptics—with the aim of reducing infection by more or less direct germicidal action. There has been a great deal of discussion as to the rival merits of the two systems, but to some observers at least it would appear that the differences between the so-called "physiological" and "antiseptic" methods of treating wounds are not nearly so great as at one time appeared, and that the effects sought by the best exponents of the two methods have much in common.

Antiseptics.

At first, prime importance was attached to the search for the most actively germicidal substances as judged by their action on micro-organisms suspended in various media outside the body. With the aid of these substances much was expected in the way of rapid wound sterilization, but the results were mostly disappointing. The problem was evidently not to be solved in this way, and the idea that dirty lacerated wounds could be sterilized by isolated applications of powerful antiseptics had early to be abandoned. The exponents of physiological methods did genuine service in indicating the danger and futility of such a procedure, and it was soon realized that where, as was the rule, sterilization was not effected, the concomitant injury to living tissue by the unintelligent application of corrosive antiseptics might far outweigh any advantage gained. But at the same time it cannot be too strongly insisted that experiences of this kind cannot be taken as refuting the value of every kind of antiseptic treatment. With the desire to secure crucial experiments to prove the inutility of antiseptics, wounds have been extensively swabbed with pure carbolic acid with the avowed intention of giving the antiseptic every chance. Yet, in the light of the experience of the last thirty months, the finding of organisms in the discharge from any but trifling wounds treated in this way was almost a foregone conclusion, and proves nothing as to the efficacy of antiseptics in general when employed under proper conditions.

When it was realized that the immediate sterilization of badly infected deep wounds by a single application of a "strong" antiseptic, even when applied soon after the infliction of the wound, was rarely successful, attention was turned to the repeated or even continuous application

of relatively mild antiseptic solutions, and here genuine success appears to have been obtained.

Hypochlorites.

Of the innumerable antiseptics which have been employed in the present war two appear to have been regarded with especial favour, and they have much in common. These are the calcium hypochlorite and boric acid mixture introduced by Professor Lorrain Smith under the name of "eusol,"[8] and neutral sodium hypochlorite solution, the preparation of which was described in this JOURNAL.[9] The composition of the latter solution has been modified by various writers in minor details without much essential change. Although the germicidal action of hypochlorites has long been made use of for water purification and other similar hygienic purposes, until recently they had seldom been used for surgical purposes, except occasionally for the removal of sloughs. One reason for this is undoubtedly to be found in the fact that commercial hypochlorite preparations commonly contain free alkali, and hence are intensely irritating. The presence of free alkali is guarded against in the preparation of the two solutions just mentioned by substantially the same method, which may be incidentally referred to as illustrating the application of a well-known physico-chemical principle. It has long been known that when a polybasic acid, such as phosphoric or carbonic acid, is partly neutralized by successive additions of alkali, a point is reached when the solution contains a mixture of acid and neutral salts which reacts approximately neutral to suitable indicators. To such a solution moderate additions of either acid or alkali may be made without changing the reaction of the solution, the only change being variations in the proportions of various salts. This mechanism, as Henderson and others have shown, is largely responsible for the maintenance of the essential neutrality of blood and other body fluids under changing conditions. In the case of the antiseptic solutions under consideration, the polybasic boric acid was chosen for adding to the alkaline hypochlorites, so that the resulting solutions were capable of maintaining neutrality. Using similar principles, Daufresne has developed a hypochlorite solution containing no boric acid but a mixture of carbonate and bicarbonate. Such solutions are referred to as "buffer solutions," indicating their ability to reduce the actual change of reaction due to the addition of either acid or alkali.

These hypochlorite preparations are probably used more widely than any other antiseptic solutions at the present time, not only in our own Army Medical Service but in the allied countries, and from recent reports it appears that the Germans have been making extensive use of them as well. They were both developed as the result of work carried out on behalf of the Medical Research Committee. The wide adoption of these antiseptics in preference to those more generally used prior to the war is significant, especially in view of the disfavour with which antiseptics in general were regarded a short time after the outbreak of the war, as a result of their comparative failure to meet the demands then made upon them.

This preference for the hypochlorite antiseptics as compared with many others appears to be supported by both clinical results and by laboratory investigations. The solvent action of hypochlorites on necrotic tissue is a great advantage when contrasted with the coagulating effect of many antiseptics on blood serum and wound exudates. The former action of hypochlorites permits the wound surface to remain moist and so removes obstacles to the outward flow of lymph, which is so readily checked by antiseptics which are protein precipitants. Moreover, the hypochlorites, by virtue of their strong oxidizing power, appear to react readily with the toxic products of bacterial activity—and indeed this action, as will be referred to later, has been used by Dean for the preparation of dysentery toxin of greatly diminished toxicity, but otherwise potent for the production of antibodies. The diminution in general toxaemia following the free use of hypochlorite in old, badly infected wounds, especially fractures, in which sterilization is incapable of attainment, is a common observation, as well as the increase in the toxaemia following its abandonment or replacement by some other solutions. Furthermore, from the experiments of Wright,[10] it appears that hypochlorites are preferable to antiseptics such as phenol or iodine, since they differ markedly from the latter in being less disturbing to a favourable balance between the antitryptic and tryptic effects in fluids such as are formed by wound secretion. Wright regards this as the probable explanation of why wounds treated with hypochlorite suppurate less and heal better than did the wounds treated in the earlier period of the war with the antiseptics then in use. The suggestion that antitrypsin plays an important part in the normal bactericidal properties of blood, as put forward by Wright and others, has an obvious connexion with the above opinion, and in this relation it may be recalled that hypochlorites, like many other active chemical substances, when injected intravenously into animals, produce first a fall and then a marked rise above normal of the antitryptic value of the blood serum.

Synthetic Dyes as Antiseptics.

The selective antibacterial action of certain synthetic dyes (crystal violet, malachite green, etc.) has long been applied by bacteriologists in the preparation of differential culture media. The work of Ehrlich and his school on the specific therapeutic action of certain dyes in protozoal infections is also well known. The special need created by the war for substances of low toxicity to the tissues of higher animals, but of high antiseptic potency, has led to the use of several dyes for the disinfection of wounds. Very good results have been obtained by using dyes of the triphenylmethane series (crystal violet, malachite green, brilliant green). Fildes, Rajchman, and Cheatle,[23] who were among the earliest workers to apply the disinfecting action of such dyes to wound treatment, used a mercury compound of malachite green, sprayed on to the wound surface in alcoholic solution, and obtained better results than with either malachite green or mercuric chloride alone. A recent publication by Browning[24] deals with a further development of the use of dyes as antiseptics, and describes results of extraordinary interest and promise, obtained with a dye of the acridine series, of which the trypanocidal value was studied some years ago by Ehrlich. This substance, "trypaflavin" (diamino-methyl acridinium chloride), has been found to have a high general antiseptic value by Browning, who, on account of this more general application, proposed to call it "flavine." Browning finds that, while the antiseptic action of all other substances examined, including the dyes mentioned above, is greatly diminished by the presence of blood serum, that of flavine is not only not diminished, but is conspicuously increased, even to five times its potency in water. This, taken in conjunction with Browning's further observation that flavine is harmless to the tissues, and even to the activity of leucocytes, in concentrations having a strong antiseptic action, awakens great expectations concerning its therapeutic value in various infections. Preliminary trials have already confirmed its efficacy in the treatment of septic wounds, and the results of the more extended trial, which will be carried out under the Medical Research Committee as soon as adequate quantities of the dye are available, will be awaited with interest.

THE CHEMISTRY OF DISINFECTION.

But the measure of success achieved by many surgeons in the treatment of infected wounds with hypochlorite antiseptics has been due to much more than the substitution of one antiseptic lotion for another. Granted that hypochlorites possess certain advantageous properties not shared by other antiseptics, their employment requires the observance of other essential conditions if success is to be obtained. The development of these conditions, apart from the necessary surgical interference, was based on laboratory work. The researches of C. J. Martin and Miss Chick have done much to supply accurate information as to the laws of disinfection. From studies on the rate of disinfection by mercuric chloride, silver nitrate, and phenol acting on *B. paratyphosus* and spores of *B. anthracis*, Miss Chick[11] concluded that a very complete analogy existed between ordinary chemical reactions and the process of disinfection, one reagent being represented by the disinfectant and the second by the protoplasm of the bacterium. In the case of the spores the process of disinfection proceeds with a reaction velocity in accordance with the well-known equation for a unimolecular reaction, if figures representing "numbers of surviving bacteria" are considered and taken as the equivalent of "reacting substance." In the case of *B. typhosus* departures from the simple law were noted owing to permanent differences

in resistance to the antiseptic among the individual organisms. The rate of disinfection in all cases was greatly increased by rise in temperature, the velocity being increased three to ten fold by an increase of ten degrees Centigrade.

If the act of disinfection be thus regarded as a chemical reaction proceeding with a definite velocity, the successful use of antiseptics will depend on the establishment of conditions such that the reaction may be pushed as far as possible towards completion in any given period of time. Increase in the active mass of antiseptic and rise in temperature will favour the course of the reaction, but in the case of wound treatment these factors are obviously limited by other considerations. In the case of hypochlorites, the maintenance of an effective mass of antiseptic in a wound cavity is a difficult problem on account of the ease with which these substances enter into combination with proteins and other compounds in the wound exudate. Of these products, those which contain active chlorine united to nitrogen retain their germicidal action while the others lose it entirely. It is for this reason that the technique employed by those who obtain really satisfactory results with the hypochlorite antiseptics requires such careful observance. The repeated renewal of hypochlorite solution in wounds which have received adequate preliminary surgical treatment is a practical necessity that is easily understood if the rate of its disappearance is borne in mind, but this has too often been overlooked by those who hope to find special curative action following infrequent administration of these antiseptics. The technique employed by Carrel and Dehelly in France and by Sir Berkeley Moynihan[12] and many others in England, by which frequently renewed quantities of hypochlorite—the amount varying with the character and surface extent of the wound—are injected into the cavity and its recesses by means of rubber supply tubes, is a natural consequence of the chemical properties of the antiseptic they employ. As in the case of the treatment of wounds with hypertonic salt solution and other irrigation methods the technique is of prime importance, and success or failure depends to a greater extent upon this than upon minor details in the composition of the solution.

The widespread adoption of hypochlorites for antiseptic purposes invited chemical studies as to their mode of action. Apparently there are great differences in the way antiseptic substances act. Miss Chick's experiments confirmed the view that the metallic ions resulting from the electrolytic dissociation in solution of salts such as mercuric chloride and silver nitrate are the real disinfecting agent rather than the salts as a whole, and this conclusion is in harmony with some unpublished results showing that some double cyanides of silver which do not dissociate normally have a surprisingly low germicidal action. Cooper,[13] working at the Lister Institute, concluded that the germicidal action of phenol is not due to a typical union of the phenol with bacterial protoplasms, as is probably the case with formaldehyde, but rather to a de-emulsifying effect upon a colloidal suspension of some constituent protein essential for the vitality of the organisms. In the case of hypochlorites direct chemical action upon bacterial proteins, and any other protein which may be in the medium, undoubtedly occurs, and the germicidal substances so formed may contain much active chlorine linked to nitrogen as NCl groups. A systematic study of many synthetic substances containing this grouping led to the conclusion that almost all of them possessed high antiseptic properties, and one of them, toluene sodium sulphochloramide, or chloramine-T, has been used on an extensive scale. Its manufacture was first undertaken in England, and it is now made by many firms here and abroad. Apart from the use of the substance for general antiseptic purposes, its stability permits its use in very dilute solution under conditions in which hypochlorites would be too irritating. One of the most interesting applications of this substance has been worked out by Colonel Gordon and published in this JOURNAL. Carriers of the meningococcus, when placed in an inhalatorium and subjected to the action of a steam spray carrying the antiseptic in fine suspension, have been freed from this organism in satisfactory manner, and the successful extension of the method to other infections of the upper respiratory passages seems likely. Here again, as in the use of antiseptics for wound treatment, details of technique in the presentation of the drug are of cardinal importance.

SYNTHETIC DRUGS.

Among the many tasks which confronted chemists at the outbreak of the war, few were more urgent than that of preparing adequate quantities of certain drugs for the supply of which we had previously been dependent on hostile countries. Much of this work has been done in a successful and unobtrusive way in the laboratories of chemical manufacturers, while in other cases the assistance of organic chemists on the staff of our universities has been freely and cheerfully given. It is unnecessary to go into details with regard to the individual products, which cover a wide range, but, as is well known, the demand for arsenical compounds of the type of salvarsan and various local anaesthetics such as novocain and eucaine was particularly heavy and has been well met. It will be recalled that the latter substance is an acetone derivative, and in this connexion reference may be made to the development in this country, since the war commenced, of the industrial production of acetone by a fermentation process. This new industry promises to be of great utility. Salvarsan and its congeners and the local anaesthetics are now produced in a thoroughly successful fashion not only in this country but also in Canada. The control of the quality of salvarsan offered for sale in this country has been cared for by the Medical Research Committee, while in Canada the manufacturers' product is tested in the laboratories of the Pathological Department of Toronto University.

An interesting investigation on the fate of salvarsan and neo-salvarsan has recently been published by W. J. Young.[14] This author finds that these substances, when injected intravenously into goats, give rise to the presence of arsenic in the blood plasma and corpuscles in a form which cannot be removed by dialysis but which can be precipitated with the serum proteins by tannic acid. A similar behaviour is shown by atoxyl. No such combination could be observed when inorganic arsenic preparations were injected, and it would appear as if the varying therapeutic effects of different types of arsenic preparations depended, at least in part, on whether non-dialysable arsenic appears in the blood. Careful studies of the rate of arsenic excretion following administration of salvarsan and neo-salvarsan have been published by Webster.[15]

Although so much remained to be done to supply existing demands, a few new therapeutic products of approved value have been introduced. Among these mention must be made of the introduction of emetine bismuthous iodide by H. H. Dale[16] for the treatment of carriers of amoebic dysentery. This substance was suggested by Du Mez as of possible value, and Dale's work has definitely shown that carriers who have long been treated without success with emetine administered hypodermically in the ordinary way, can be freed from infection by the new drug, which, unlike emetine itself, can be given by the mouth.

A new synthesis of β-iminazolethylamine, a substance which was shown by Barger and Dale to be one of the most physiologically active constituents of ergot, has come to light in a rather curious way. In studying the oxidizing action of the antiseptic chloramine-T upon various amino acids derived from proteins, it was found that many of these substances were converted into cyanides with one less carbon atom than the original substance. Histidine, for example, gave cyanomethylglyoxaline, and the latter substance, as was already known, gives the active β-iminazolethylamine on reduction.[17] The reaction promises to be of technical value for the preparation of this and allied physiologically active amines.

PHARMACOLOGICAL RESEARCH.

In relation to pharmacological research, reference must be made to an extraordinary investigation in the chemistry of the opium alkaloids recently published by W. H. Perkin.[18] The work mainly deals with cryptopine, an alkaloid occurring in such small quantities that 10,000 lb. of opium were needed for the preparation of 5 oz. of the hydrochloride. The breaking down of cryptopine, mainly by oxidation under carefully regulated conditions, with the formation of substances either of known structure or which were subsequently synthesized, and the deduction of the probable molecular arrangement of the parent alkaloid from the structure of these simpler derivatives, is a triumph

of experimental skill and theoretical insight. Scores of new compounds were carefully characterized in the course of the work, which throws much interesting light not only on the structure of cryptopine and protopine, but on other related alkaloids. It is of course unnecessary to refer to the fact that it is to researches such as these that we owe inspiration and direction, not only in the work of the synthetic preparation of the natural alkaloids of therapeutic value, but in the artificial synthesis of new drugs.

Cushny[19] has lately made some noteworthy observations on the pharmacological antagonism existing between atropine and pilocarpine. These experiments were made on the salivary secretion, and showed that in different dogs a constant amount of atropine was necessary to oppose the action of a constant amount of pilocarpine, and in the same dog the ratio of the two drugs remained the same, irrespective of how the actual amounts injected might vary. It appears, therefore, that the antagonism proceeds according to the laws of mass action rather than those of simple chemical combination in definite proportions. The investigation is an interesting example of the application of physio-chemical methods to the elucidation of the mechanism of the action of drugs.

Antitoxic Serums.

Reference has already been made to the discovery by H. R. Dean and R. S. Adamson[20] that the toxicity of Shiga dysentery vaccines could be enormously reduced by the restricted action of hypochlorites and other oxidizing agents without lowering their immunizing power. This gratifying and rather surprising result has been abundantly confirmed, and points the way to a number of other allied problems of practical importance which might be successfully attacked, especially if an adequate analysis of the chemical reactions concerned should result from further investigation.

One result of the war has naturally been an enormously increased consumption of various antitoxic serums. The concentration of serums by the use of fractional precipitation of the contained proteins by salts such as ammonium sulphate has led to the preparation of high titre serums from which much of the inert material has been removed. In a recent communication from the antitoxin laboratories of the Lister Institute at Elstree, Miss Homer[21] has described a number of practical improvements in the methods originally developed by Banzhaf and Gibson, which promises to make the method easier to carry out and to give more uniform results.

Theoretical studies by Dale and Hartley[22] on the relation of anaphylaxis to different serum proteins offer some practical considerations. They show that each and all of the individual proteins of a serum can act as anaphylactic antigens, and that the ideal to be aimed at in concentrating the curative elements in a specific immune serum is simply the reduction of the ratio of total protein to antitoxic value. For the purpose of reducing serum reactions the elimination of albumin appears to be as important as that of the euglobulin when, as is usually the case, the pseudoglobulin is the fraction carrying the therapeutic power. Dale and Hartley find that the latent period of sensitiveness to albumin is relatively long compared with the globulins, and this may have a bearing on the successive crops of serum rash which have been recorded as following a single injection of serum.

Protection against Poisonous Gases.

In closing, reference must be made to an extremely important branch of biochemical work about which, for obvious reasons, little can be said. The introduction of gas warfare by an unscrupulous and inhuman foe at once led some of the ablest chemical and physiological investigators in the country to devote their energies to devising the best methods of protection against asphyxiating gas and lachrymatory shells. The ingenuity displayed by the enemy in employing every conceivable means of chemical attack has been steadily met by corresponding improvements in methods of protection. These researches, often conducted at considerable personal risk, have presented problems calling for rapid solution, which demanded the highest grade of scientific work, and it is unfortunate that more cannot at present be written of the admirable way in which these problems have been solved. No line of scientific endeavour is more appealing than that of giving to our own and allied soldiers the best possible protection against this barbaric form of attack, and the success that has been attained must be universally appreciated.

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The Croonian Lectures

ON

ADAPTATION AND DISEASE.

DELIVERED AT THE ROYAL COLLEGE OF PHYSICIANS, JUNE 14TH, 1917.

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LECTURE I.

Introductory: The Basal Problem of Evolution.

I CAN well imagine that in these critical days, had you honoured a civilian Fellow of the College with the invitation to deliver the Croonian Lectures, he would have found it difficult to offer to you material which he, and which you, regarded as reaching the standard attained by the long series of his predecessors. There is no Fellow of this College who does not find the war and its issues so all-pervading as to exclude full and uninterrupted consideration of other topics. Still less can one who has donned khaki and been given an administrative post do justice to the opportunity most graciously afforded to me. He could, it might be urged, select some branch of military medicine as his topic, but to do this while the war is in progress is to sacrifice perspective and afford an incomplete presentation. Administrative duties in the office have debarred me from sustained personal observation and research in the clinic or the laboratory. The time is not yet ripe to attack the vast mass of material bearing upon the incidence of disease in the army already collected by the Medical Research Committee at the British Museum. It will, in the first place, demand long months before that material is sorted and ready for statistical and other studies; in the second place, the policy of publication of studies of this nature during the continuance of the war may well be called in question; and, lastly, it has to be confessed that, taken as a whole, the material collected at the British Museum, while far in advance of any collected in any previous war, is nevertheless of value only for comparison with the statistics gathered in these previous wars. The nomenclature of disease employed—an abbreviation of that established and authorized by this College—is in many respects not sufficiently precise for a thorough analysis. There are, for example, many forms of acute nephritis and of valvular disease of the heart. The official nomenclature does not encourage any precise distinction between the various forms. My colleague, Captain G. Campbell, C.A.M.C., has afforded me evidence that gonorrhoeal endocarditis is more frequent in the army than in civil life; but the material collected—the index cards, medical case sheets, etc.—in itself gives no indication of this increase. In short, so far as I can see, the only way in which the material now being collected can be rendered valuable from a scientific point of view, is for specialists both here and overseas to make an intensive study of groups of individual

cases, sufficiently large to permit them to apply the results obtained to the sum total of the cases belonging to those groups which have been recorded.

This being so, I have almost inevitably been led to choose for these lectures the consideration of a subject which is as far as possible removed from war and its concerns, and to afford you not present studies, but a summing up of the work and conclusions reached gradually in the years that preceded the war. Taking this course, I must of necessity refer to and repeat data and deductions which I have employed in earlier writings. If, taking this course, I from time to time evince a less suave and a more militant spirit than that to which these walls have been accustomed, I must beg you to be lenient and to attribute my declension from grace to the environment of the last two years. For in so doing I must of necessity take up the cudgels on behalf of medical workers as against the upholders of what is to be regarded as the dominant biological teaching of our time. Indeed I have selected this subject of adaptation and disease, not merely because of its importance to us as physicians, but also because of its broader biological significance. The time is ripe, and more than ripe, for attention to be directed to the bearing of the investigations of the bacteriologist on the one hand, and of the student of immunity on the other, upon what are some of the most important problems of general biology. For some little time I have been impressed by the fact that the latter-day investigations in medical science are of the very highest significance to the general biologist, and that, with singularly rare exceptions, the professional biologist—be he zoologist or botanist—is superbly indifferent to them and to their bearing upon the basal problems of heredity and variation, and this notwithstanding the fact that investigations into heredity and variation are, and must always be, his greatest concern.

For this indifference or neglect there are, or may be, several extenuating circumstances. We ourselves are largely to blame in that we are more concerned with the bearing of our results upon our own medical work than with their wider biological significance. This wider significance, if it is referred to at all, finds incidental note. The titles of our articles, that is, are not such as attract the attention of the biologist, nor do we publish in the journals to which he is addicted. The *Journal of Pathology and Bacteriology*, the journals of *Experimental Medicine*, of *Hygiene*, of *Infectious Diseases*, of *Medical Research*, are as unknown territory to him as the *Quarterly Journal of Microscopical Science* or the *Proceedings* of the Linnean Society are to us. We would sooner think of writing a letter to the *Times* than to that academic go-between of men of science, *Nature*.

And then, again, just as in the old unhappy far-off days a Bart's man disbelieved that any good surgery could come out of Thomas's or George's, and the Thomas's or George's surgeon returned the compliment, just as the British medical man disbelieved such articles as appeared in the American medical journals, or, to come nearer to our own times, just as the Germans of late years, with rare exceptions, regarded themselves as the sole recipients of pathological truth, treating British and French pathologists in general as very Nazarenes, so, it has to be confessed, there is a tendency for the academic biologist to be indifferent to, if not actually to resent and throw discredit upon, the work of those who, not belonging to his particular class, are therefore to be regarded as of the nature of outsiders. This is not a revelation of the spirit of pure science, but a comforting demonstration that men of science are after all pure human beings. Underlying this spirit is a natural and in many respects wise caution in accepting the observations of workers with whose quality and standing the individual is unfamiliar. But this hesitancy may be carried too far.

If I speak with a little feeling, it is because I still cannot forget the reception accorded by zoological *confrères* to the most original, and at the same time most sound physiologist of his period, a Fellow of this College, my old teacher and friend Walter Gaskell, when he was led by his studies upon the functions of the nervous system—studies which have so profoundly influenced modern medicine—to trace its development, and doing this, after long years of close study of its comparative morphology, to reach conclusions regarding the origin of the vertebrata which were not in harmony with the doctrines of descent then currently accepted. So far as I, an outsider, could determine, each link in the chain of Gaskell's reasoning was supported by appeal to observed facts, and by microscopical studies of singular interest; so far as I, a pathologist, could test his conclusions, I found that incidentally they explained, as no other or earlier work had explained, the inter-relationship between the sympathetic system and the endocrine system, between the pituitary, thyroid, adrenals, and genital organs. Nor, so far as I can weigh evidence, can I find that any essential link in the chain has been shown to be out of place. Yet the attitude of the morphologists as a body was that of the Levite of the parable; his brother physiologists could not take up the cudgels on his behalf; it was for the morphologists to test and declare the value of the morphological evidence upon which his conclusions were based, and the morphologists in general declined to notice it, but, as though they regarded it as presumptuous for him, a physiologist, to enter their territory, they passed by on the other side. And the years followed the years, and Gaskell died feeling sore that the most sustained piece of work of his life had been side-tracked by those whom it should most have interested.

Do not misunderstand me, and think that I am making a specific attack upon zoologists and botanists. As I have pointed out, we of the medical profession are tarred with the same brush. All I would urge is that just as those of us who are most interested in the advance of medical science accept gladly the results and the discoveries of workers in all branches of science, applying them to the elucidation and treatment of disease, so, in return, when investigators into the problems of medicine make notable advances, these be accepted willingly and utilized by the workers in other branches. It is not a matter of what we owe to those other branches in the first place; that is freely admitted. The renascence of medicine in our generation is due to the labours of men like Ferdinand Kohn the botanist, Pasteur the physical chemist, and Metchnikoff the zoologist, but if the dwarf perched on the shoulders of the giant* sees further and sees more than does the giant, it is not well to neglect his observations on the ground that he is a dwarf.

THE NATURE OF VARIATION.

The supreme biological problem of our times has been that of the ways and means of evolution. The fact of evolution all thinking minds accept. But as to how evolution has been, and is being, brought about is a very different matter. There is still as much debate as there was in the year following the publication of the *Origin of Species*. Upon consideration, it will be seen that the fight truly centres upon the cause or causes of variation—whether the tendency to vary is something inherent in living matter, numerous variations being produced through this inherent tendency of which those that are best fitted for their environment alone survive and are perpetuated, or whether variation is primarily and essentially brought about by the influence of forces acting from without upon a relatively labile living matter—whether, that is, variability is primarily inherent, proceeding from within, or primarily acquired, proceeding from without.

This, I would emphasize, is the basal problem of evolution, but oddly enough it has been largely neglected, the fight through all the years waging around what after all is a secondary problem—that, namely, as to whether properties acquired by the parent are capable of being transmitted to and reproduced in the offspring. Long years prior to Darwin, you will remember, Lamarck propounded that they were, as did Erasmus Darwin and Lord Monboddo; Darwin wanted to believe that this was possible, but could obtain no clear evidence, and brought in finally a verdict of "non proven." Herbert Spencer made this transmission one of his principles of biology, but Weismann violently opposed the doctrine, carrying with him the bulk of latter-day biologists, until to-day Bateson, replete with his studies upon Mendelian properties, reaches the antipodal suggestion that when a new property manifests itself in any

*As might be expected, this metaphor was not original with the author of the *Anatomy of Melancholy*. I find that Firmin-Didot (Alde Manuce, Paris, 1875, p. 343) cites Haureau (*Histoire de la Philosophie Scholastique*, Paris, 1872) as deriving it, according to Johannes Sarisberiensis (*Metalogicus*, vol. iii, cap. 4), from Bernard of Chartres in the twelfth century.

individual of any species it is not new, not due to addition, but to subtraction and loss of properties already possessed; there is nothing new under the sun, and in his opinion evolution—like a squid—progresses backwards; what appears to be a new property is on the contrary primaeval, is the epiphany of a property possessed by the forerunners of the species which all along has lain latent, present but unable to manifest itself in consequence of the coexistence of inhibitory factors.

That I may not be thought to exaggerate or misstate let me quote in the first place from his address on heredity delivered to the International Medical Congress here in London in 1913:

> Perverse as such a suggestion may appear, I do not think we should close our minds to the possibility that these dominants arise by a process of loss of some inhibitory factor. . . . Let me call your attention also to the inference which this suggestion would have on the conception of evolution. We might extend the same reasoning to all cases of genetic evolution, and thus conceive all alike as due to loss of elements present in the original complex.

That clearly this was not a passing fancy is shown by the address delivered by him at Melbourne in the summer of 1914 as President of the British Association for the Advancement of Science.

> We are even more sceptical (said Professor Bateson) as to the validity of an appeal to changes in the conditions of life as direct causes of modification, upon which, latterly at all events, Darwin laid much emphasis. . . . Abandoning the attempt to show that positive features can be added to the original stock, we have further to confess that we cannot often actually prove variation by loss of factors to be a real phenomenon.

Nevertheless this must be so, and he quoted the case of the "Coral King" Primula, given off from the "Crimson King," concluding that here "The salmon (pigment) must have been concealed as a recessive from the first origin of the variety," and continued:

> Variation both by loss of factors and fractionation of factors is a genuine phenomenon of contemporary nature. If we have to dispense, as seems likely, with any addition from without, we must begin seriously to consider whether the course of evolution can at all seriously be represented as an unpacking of an original complex which contains within itself the whole range of diversity which living things present.

And further:

> At first it may seem rank absurdity to suppose that the primordial form or forms of protoplasm could have contained complexity enough to produce the divers types of life. But is it easier to imagine that these powers could have been conveyed by extrinsic additions? Of what nature could these additions be? Additions of material cannot surely be in question. . . .

And he winds up:

> In spite of seeming perversity, therefore, we have to admit that there is no evolutionary change which in the present state of our knowledge we can positively declare to be not due to loss.

Now, Professor Bateson is scarce a believer in the multiple origin of animal and plant forms; we know, indeed, that years ago he traced man and all vertebrate forms from the invertebrates through an out-of-the-way animal, Balanoglossus; and incidentally, in his Melbourne address, he mentions this solution of the problem only to reject it. Wherefore, pushed to its logical conclusion, the Batesonian doctrine means this: that the primal unit, or units, of protoplasm, from which all living animal and plant forms have descended, possessed within it in a latent form the "Anlagen"—or, not to be beholden to our enemies, the originals—of every organ and distinctive portion of an organ or part, even down to the conformation and coloration of individual hairs and scales, and feathers and leaves, and petals and stamens, of all the manifold forms of life subsequently derived therefrom; that which was to outward seeming the most simple form of life was verily in constitution the most marvellously complex; and that, actually, what we regard as the higher forms of life are the lower, owing their development not to progressive accretions of properties, but to the reverse; so that "reversion," instead of being a degenerative manifestation, a loss of properties acquired by the species, is on the contrary a recovery of higher and completer powers. Did ever any exercise of mediaeval scholasticism lead to more perverse conclusion?

The truth seems to be that Professor Bateson and the Mendelians, so far as regards the problems of evolution, are working in a cul-de-sac. Valuable and fascinating as are their observations for the establishment and amplification of the law discovered by Gregor Mendel, of cross-breeding of members of a species, that law only deals with the interplay of allelomorphs, that is, with the combinations and permutations of what, for simplicity sake, may be termed positive and negative unit properties possessed by the species; it only establishes the extent of the variation possible *within the boundary of the species*, and granting the existence of a definite number of allelomorphs, the number of possible strains obtainable within the limits of the species. But here it stops—save that of late workers have recognized the possibilities of fractionation of allelomorphs, and so of increase in the number of permutations and combinations. Accepting Mendelian data, I fail to see how any amount of interplay between properties already possessed by the species will result in the production of individuals which are outside the species. At most we produce different strains of that species which, by cross-fertilization with other strains, produce individuals reverting to the usual type or types. If you invest in a kaleidoscope at a toy shop, if the mirrors are set at an angle of 60 degrees, no amount of rotation will produce other than a six-sided pattern, or increase the number of colours in the pieces comprising the pattern; only from without can new elements of other colour be added, thereby producing patterns of a new order; only from without can the angle of the two mirrors be altered so as to produce, say, a twelve-sided pattern. The interplay of allelomorphs is not evolution, nor is it capable of throwing light upon the progressive development of new species. When Professor Bateson, from the vantage ground of his studies of the last fifteen years or so, begins to lay down the law regarding evolution, I cannot but help being reminded of Bombus, the bumble-bee—I would not say "in vacuo bombinans," for that was said of a zoological monstrosity, and Professor Bateson is no Chimera, but, blundering out of the fields and hedgerows into a greenhouse, and bumping its head noisily again and again against the glass because of its incapacity to drive into that head the fact that transparency and penetrability are not necessarily associated phenomena.

Nor is he alone. It so happens that some eighteen months ago, at the request of a Fellow of this College, I found myself drawn into a lively discussion with the Nestor of British biologists. I had not sought the fight, but, once in, confess that I enjoyed the opportunity of measuring my lance against so doughty a knight. The discussion arose over a statement by the Fellow in question that the biologists of to-day had much to learn by turning their attention to the results being gained in medical laboratories. And, sure enough, after protesting with not a little vigour that the boot was on the other foot—that we medical men in our ignorance of biological progress were rediscovering and regarding as our own what had been gained by zoologists and botanists a generation or so previously—Sir Ray Lankester proceeded to justify absolutely my friend's original contention by urging that one fallacy in all Lamarckian doctrine* is that adopted by Herbert Spencer—namely, what he called "direct adaptation." There is really, he laid down, no such thing. The supposed mysterious, and as it were miraculous, property of direct adaptation is always due to survival by selection of organisms which varied in many directions—the production of corneous epithelium, of increased hairiness, etc., being favourable variations which hence have become inherent in tissues of all animals.

Here, then, we see the two foremost British biologists of our day, the one in doubt whether change in environment can be a direct cause of modification, and filled with these

* I confess that I do not like being dubbed a Lamarckian, and that because, as commonly accepted, Lamarckianism is supposed to deal purely with the direct acquirement of alteration in structure through use and environment, and Herbert Spencer, by using the term "direct adaptation," is largely responsible for this vulgar error. The phenomena with which we pathologists deal present modification of structure merely as a secondary change; our phenomena underlie structural alteration. But in justice to Lamarck it deserves note that he expressly lays down "whatever the environment may do, it does not work any direct modification in the shape and organization of animals. But great alterations in the environment of animals lead to great alterations in their needs, and these alterations in their needs necessarily lead to others in their activities. Now, if the needs become permanent, the animals then adopt new habits which last as long as the needs that evoked them," and it is the new habits, he points out, which induce the structural alteration. (I quote from Hugh Elliot's excellent translation of the *Philosophie Zoologique*—Lamarck, *Zoological Philosophy*. Macmillan, 1914, Cap. 7.) Granting this, I hold that the physico-chemical exp'anation which will be put forward in the course of these lectures is something more precise and more limited in its scope than the vague "habits" of Lamarck.

doubts, accepting as a postulate that positive features cannot be added to the original stock, whereby he is led to an utterly perverse hypothesis; the other equally denying that there can be external influences of such a nature that specific variation—that is, variation in particular directions—may be induced, and taking the stand that variation is multitudinous, the favourable variation alone having the opportunity to be propagated and reproduced.

Now, if there be one fact that is constantly being impressed upon the student of immunity and the worker in pathogenic bacteriology, it is that "direct adaptation"—that is, specific modification in response to a specific alteration in environment within limits which will presently be laid down—is one of the basal phenomena of living matter. Our studies make it impossible for us to be blind to the fact that environment is capable of exerting a profound influence upon living beings, bringing about modifications of function and even of structure in particular directions. But evidently our experience and the diverse observations upon which that experience is based are unknown to the academic biologists. It is for this reason that it has seemed to me a useful task here, under the shade of Harvey, to bring together and marshal in order the data bearing upon this matter as they present themselves to us.

The Method of Attack.

There are two ways by which problems of this nature are *a priori* most likely to be solved, namely, by experiments upon the very simplest and, again, upon the most complex forms of life. I see that Dr. Bayliss as a physiologist casts doubts upon the value of the former as compared with the latter,[1] pointing out that their very simplicity is in the majority of cases a disadvantage, and quoting Claude Bernard to the effect that the lower (unicellular) forms of life possess all the essential properties which exist in the (multicellular) forms higher in the scale, but possess them in a confused state, distributed as it were throughout the organism. The one organic cell fulfils a variety of purposes which in the higher organisms are relegated to distinct groups of cells. While freely admitting this contention as regards the study of function, it has to be pointed out that for problems of adaptation and heredity the unicellar organisms possess the supreme advantages of rapid reproduction, coupled in the very lowest forms (according to our present knowledge, or want of knowledge) with a complete absence of the disturbing influence of sex and conjugation. There is, that is, a greater likelihood of obtaining results, and the experiment becomes simpler where we can in the course of a few hours subject 100 generations to a particular alteration of environment, than when weeks, months, or years elapse before one new generation shows itself. In the latter case, to obtain results, either the alteration of environment must be made intensive to a degree that is likely to interfere with various vital functions, or, exhibited in a less intensive form, must act over unduly long periods. I know that certain biologists are unwilling to regard the products of asexual binary division of the bacteria, or the torulae of yeast, the results of budding, as true generations, and deny the right to regard the individual bacillus as an individual. One very distinguished biologist went so far as to declare to me that a long cultivation of a bacterial growth is "one continuous individual"—in other words, that not merely do all the millions of bacilli in a single colony, say of the *Bacillus tuberculosis*, constitute one individual, but that one individual *Bacillus tuberculosis* is spread all over the habitable world, and that tuberculosis and not the tubercle bacillus is the entity. This is an impossible position; it formulates that the "divisa" are "indivisum." The very idea of individual connotes independent existence, or if we take a wide survey and include forms like the compound myxomycetes, hydrozoa and polyzoa—potentially independent existence. When a bacillus grows and divides, and each half floats away, there is no longer one individual; and whether, as among the bacteria, the division is binary, or, as in man, one of the many billions of cells that constitute the body undergoes a similar binary division, and one of the products floats away and becomes fertilized, in both cases we deal with the development of a new generation. By the same process of reasoning, basing ourselves upon the doctrine of the continuity of the germ plasm, we might with equal logic declare that all living beings constitute one continuous individual!

And as regards the advantage in researches upon the bacteria of being freed from the perturbing factor of sex, let me interject that, starting with Weismann and his doctrine of amphimixis, but more particularly during the last fifteen years under the influence of the Mendelians with their studies upon cross-breeding, we have been inclined to lay far too much stress upon the part played by sexual conjugation in the production of variation. In nature, in general, the tendency, if not the function, of sexual conjugation is to preserve the mean, not to induce the extreme, to perpetuate the species rather than favour the variety; sexual conjugation only preserves and intensifies a variation when circumstances favour the segregation of individuals of the two sexes each possessing the variation, or, I would add, when those circumstances actually lead to the appearance of the variation in more than one individual in a particular locality. Even if a property be dominant, with indiscrimate mating, and without segregation, such new property is apt to show itself in fewer and fewer individuals in successive generations. In simpler language, turn a highly-bred mastiff or terrier or beadle loose in a canine population, and his descendants descend to plain yellow dog. It follows, therefore, that on the whole we are more likely to obtain results where this levelling action of conjugation is wanting.

I propose, therefore, in the following lectures to take up first the evidence of adaptation as affecting the pathogenic bacteria, next of adaptation as it affects man and the higher animals, and lastly, to discuss the application of the data brought forward to our conception of disease and disease processes on the one hand, of the evolutionary process on the other.

Reference.

[1] W. M. Bayliss, *Principles of Physiology*, 1915, p. 291.

LECTURE II.

Adaptation in Microbes and the Evolution of the Infections.

(*Abstract.*)

In his second lecture Colonel Adami asked whether it was not absurd to think that the infectious diseases now known to us had afflicted man from his first appearance on the planet. But if this were so, how had they originated?

After a rapid review of the present-day infections that were known to the Greeks and the Hebrews, and of the results of the late Sir Armand Ruffer's palaeopathological studies upon Egyptian mummies, the evidence of caries, osteo-arthritis, etc., in tertiary fossils, the matter of the antiquity of the bacteria was touched upon—Van Tieghem and Renault's findings in the coal measures, Drew's demonstration that chalk formations are due to the activity of the *B. calcis*, Garwood's similar observation of the part played by marine algae in the deposition of dolomite and oolitic formations, and Walcott's discovery of Cyanophyceae, forms closely allied to the bacteria, and of possible micrococci, in the Algonkian, the oldest of all known sedimentary and stratified rocks.

But if bacteria had been present from the beginning, this did not mean that the specific infections had been in existence for the same period. Zymotic phenomena must run parallel with geological. Examples were given of species which had remained unchanged over vast periods of geological time—for example, Lingula, the pearly Nautilus, Anaspides, Ceratodus, Limulus, and yet the vast majority of the fossils known to us were the remains of species which had developed and passed away.

So he considered it must be with infections. The reason why we could not recognize the descriptions of epidemics given by classical authors was not necessarily that they were fools and incapable of noting characteristic symptoms; more probably they described conditions no longer existing. It was known that in more recent times infections had come and gone. The trit st example was the sudor anglicus, or "sweating sickness." Many had made their appearance in comparatively recent times—for example, diphtheria, cholera, syphilis. In the course of the great war two new diseases had made their appearance—"trench fever" and "trench shin." But here a second principle might have to be considered: certain of these might have been present for an indefinite

period endemic in a particular locality, and then, with the opening up of trade routes, have spread rapidly. Admitting this, the conclusions reached by a study of the geographical distribution of animals and plants must also be admitted—that is, that where a species (such as the rabbit or sparrow), when introduced into another continent, showed an immediate spread, the fact that it was not there before was an indication that it had arisen at a period subsequent to the separation of the one continent from the other. Whichever side was taken in the syphilis controversy, it had to be confessed that this disease was non-existent in early Egypt, or in the Rome of the time of Galen.

How, then, was the evolution of an infection to be pictured?

If every infection was due to the diffusion through the body of the toxins of one or other particular species of micro-organism, it deserved to be noted that pathogenic microbes did not form an order by themselves, but, on the contrary, were singularly diverse in their affiliations. With scarce an exception every genus of micro-organism had its representatives among the pathogenic microbes, or, conversely, every pathogenic microbe had closely related forms differing from it in little beyond the fact that the one was virulent, growing in or upon the tissues, the other non-virulent.

Next, these closely allied species were found suggestively either growing in the cavities and on the mucous surfaces of the body, or in the water and foodstuffs taken up by the individual. This state of affairs in itself strongly indicated that at some period or other pathogenic microbes had originated from those saprophytic on the body surfaces, or existing in the foodstuffs. This natural deduction had been opposed notably by the German school of bacteriologists, with the late Robert Koch at their head, who stood out for fixity of bacterial species.

It had to be admitted that on studying the bacteria two apparently opposite and contradictory facts were to be made out: on the one hand, they were extraordinarily conservative; not only was it the case that, given the same foodstuffs and the same general environment, their characters remained unaltered, but also within certain limits, if their environment were changed, they retained their old characters with some obstinacy. On the other hand, there were certain changes of environment which led to certain and definite changes in the properties of bacteria, and, acknowledging this, it was necessary next to study the orders of variation which might be exhibited by them. These orders were usually given as three—fluctuations, mutations, and impressed variations or modifications. Of these, the first, best indicated by the varying heights of members of the same family, did not specially concern the discussion.

Evidence was brought forward to show that in the bacteria at least what were usually considered as mutations, chance variations, were in truth impressed variations due to specific alterations in environment. Whereas under the ordinary conditions of experiment certain members only of a bacterial colony took on the property of fermenting a foreign or new foodstuff, this condition of experiment could be so altered that all the members of the colony could with absolute precision be made to acquire this new property. The experiment could be so arranged as to demonstrate that there was here no question of chance variation, of the survival of those forms, and those forms alone, which had exhibited variation in a favourable direction, no question, that is, of survival of the fittest, but that there was, within certain limits, direct adaptation in the Spencerian sense, direct equilibration between the organism and its environment. Certain experiments recently conducted by Major F. B. Bowman, C.A.M.C., with the typhoid bacillus, proving this point, were given in detail.

Similarly, if an example were needed of variation by loss of factors, there was the classical experiment of Pasteur and his lieutenants Roux and Chamberland, in which by exposing any culture of the anthrax bacillus over a given period to a high temperature of growth, with absolute precision the power of spore production is lost, and now for years—and hundreds of thousands of generations—grown under ordinary conditions, spore production does not manifest itself.

If this were true of other properties, it must be true regarding virulence. Methods were known by which the virulence and pathogenic properties of bacteria could be surely exalted or depressed. By passage of a virus through a succession of animals of one species the virulence for animals of that species could be rapidly intensified up to a certain point, while simultaneously by this procedure the virulence in respect to animals of another species could be reduced.

What was more, it was possible to take harmless non-pathogenic bacteria, and with absolute precision, and not by chance variations, convert these into highly pathogenic virulent forms. It was this direct adaptation evidently that explained the origin of the infections, and this demonstration had been given in London by two well-trained and capable observers, Thiele and Embleton, at University College. The process was most ingenious. A perfectly harmless soil bacterium, like the *B. mucoides*, was taken—a form which might be inoculated by the million into a rabbit or guinea-pig without setting up disturbance. First, by the principle introduced by Dallinger thirty years ago and more, this was gradually educated to grow, not at room temperature, but at body heat (Adaptation No. 1). Then use was made of the principle of anaphylaxis—of developing the first stage of immunity, that of greatly increased susceptibility. A small dose of the (dead) bacilli was injected into the tissues of the guinea-pig, and then eight to ten days later a second and larger dose of the living bacilli was given. At this stage the tissues were rendered so susceptible to the specific dissociation products of the particular bacterium that they were incapable of destroying them. Wherefore the bacilli, instead of being destroyed, multiplied, and became accustomed to grow in the tissues (Adaptation No. 2). And here was the point: Simultaneously they gained the property of virulence, of attacking and breaking down the tissues of their host. If now a culture were made from the tissues of this animal, and inoculated into a second guinea-pig, this without any previous anaphylactic stage became infected—the bacteria multiplied and killed it.

There was here, then, the mechanism, or at least a mechanism, whereby a harmless saprophytic microbe might occasionally in nature find the conditions under which it became pathogenic.

But this was clearly the evolution of a new property by direct acquirement—contrary to the hypotheses and dogmas of Professor Bateson and Sir Ray Lankester.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

SOME FRIENDLY CRITICISMS.

WHILE in London lately I noticed that every man with a splinted arm carried the forearm in the position midway between pronation and supination, the palm of the hand lying against the body.

1. This is contrary to the best surgical teaching, which advocates the position of full supination for the forearm. An *x*-ray screening shows that the radius and ulna are most nearly parallel, and furthest from one another, in the supinated position. Every man with a fractured forearm, once said a leading surgeon, should have it so splinted that he can spit into the palm of his hand. An additional argument in favour of this position is that supposing rotation of the bones of the forearm be lost, by the radius and ulna uniting across the interosseous space, pronation can still be largely accomplished by lifting the arm at the shoulder; whereas a pronated hand cannot be helped by any similar movement.

2. Too little attention is paid in hospitals at the front to the stiffening of joints, often in bad positions, while wounds are healing. Men arrive home with knees flexed, feet extended and wrists dropped quite unnecessarily. This stiffness from disuse and adhesions causes considerable trouble to rectify.

3. Half the effort to secure a perfect antiseptic to replace others arises from the fact that those in use are inefficiently employed. Most syringes are furnished with nozzles which cannot reach to the bottom of many wounds and sinuses, while an irrigator nozzle is commonly shaped like a small carrot, so that the thick end plugs the wound exit and hampers any return flush. It is no wonder surgeons thus equipped slit open all sinuses.

4. When oxygen is administered to a man with respiratory embarrassment a terrifying cylinder, recalling a trench mortar, is brought to his bedside, and, after much struggling with the cocks, ice-cold oxygen is supplied to his lungs. The oxygen should first be passed into rubber bags in another room, and left to warm up to a reasonable temperature before it is taken to the bedside. By suitable pressure on the bag it may then be delivered to the patient without fear, fuss, or noise. I have never seen it administered otherwise in the South of France, nor correctly administered in England.

5. Guillotine emergency amputations in France require investigation by a competent committee, whose members know something of the after-troubles to which patients and surgeons are subjected in England in consequence.

Exeter. D. W. SAMWAYS.

A CLINICAL TEST FOR THE ESTIMATION OF THE PERCENTAGE OF GLUCOSE.

AN article bearing the above title appeared in the JOURNAL of July 4th, 1914, and as I have from time to time received many letters of inquiry and had time to reconsider some of its details, it may be interesting to enumerate the following points:

The main features, however, remain the same—namely, that by boiling equal volumes of liquor potassae and diabetic urine (previously confirmed by Fehling's test), constant colours are produced corresponding to the amount of glucose present. By treating in the same manner normal urines, to which accurately known quantities of glucose had been added, constant colours were also produced, so that a standard could be obtained for comparison.

To bring this method into a practicable and portable form, five glasses, the size of microscopic slides, were obtained, being the exact tints ascertained by experiment of equal volumes of urine containing known quantities of glucose and liquor potassae when boiled together. The glasses have labels attached showing the percentage of glucose to which the colours correspond, the number of grains per ounce, and parts per 1,000. For some intermediate tints the glasses can be superimposed upon one another, and the deep colours beyond the range of the set can be met by dilution and appropriate multiplication of the stated estimations.

Since writing the article, I have found that four glasses* are sufficient for all practical purposes; and if the colour produced at the first boiling is deeper than that of the 3 per cent. glass, it is better to make another analysis, with the sample of urine diluted, than trust to the difference in the tints of the 3 per cent. and 4 per cent. glasses, as the contrasts of colour are not sufficiently defined to give an accurate reading.

Samples should not be boiled with liquor potassae for more than eight or ten seconds, as the colour deepens with prolonged boiling. The original article contained the words "thoroughly boiled." This expression was misleading, and was corrected in my letter in your issue of September 26th, 1914. In these circumstances a holder for the test tube is unnecessary.

Again, although it is better to use exactly equal parts of the sample under consideration and liquor potassae, it is not absolutely necessary to do so, as I have found by experiment that by using one-sixth more of either the reagent or urine practically the same colour is given on boiling. A full teaspoonful, therefore, of each will suffice, and a pipette or a measure glass is not required. A square test tube gives a better reading but complicates matters, whereas every medical man has test tubes, liquor potassae and a spirit lamp. The diameter of the test tube must not exceed $\frac{5}{8}$ in. or be less than $\frac{1}{2}$ in. for obvious reasons.

Any one who may be interested in the matter might like to refer to a criticism in the BRITISH MEDICAL JOURNAL of March 16th, 1915, written by Dr. Mouillot (since deceased). He carried out, with the assistance of Mr. Leigh, the chemist at Duff House, Banff, fifty estimations, employing the method in which cuprous oxide is oxidized and weighed as cupric oxide in a Gooch crucible which is considered to be very accurate. On comparing the results obtained by the two methods Dr. Mouillot found them to approximate very closely, the mean error over the whole series being only 0.19 per cent. In some correspondence that passed between us he pointed out that although a general practitioner on an average seldom had more than two cases of diabetes a year, yet as a rule each of these cases was chronic, and required many estimations during treatment, and therefore an easy, quick, and reliable method at the bedside or in the consulting room without any complicated apparatus was much to be desired.

G. C. PARNELL, M.R.C.S.Eng.,
Consulting Surgeon to the Hospital and Home for Sick Children, Lower Sydenham, S.E.

* The set of glasses in a pocket case with full printed directions on a card can be obtained from Messrs. Down Brothers, St. Thomas's Street, S.E., or the Holborn Surgical Instrument Company, Ltd., Thavies Inn, Holborn Circus, E.C.

TREATMENT OF "BARCOO ROT."

I FOUND in Western Australia that barcoo rot was readily cured by giving a mixture containing 15 grains of potassium nitrate and 15 minims of spiritus aetheris nitrosi three times a day. Locally, the sores were treated with a weak ammoniated mercury ointment and covered up from flies and dirt. The idea, of course, is to get the kidneys to do their proper work. This in hot climates is usurped by the skin, not always quite satisfactorily.

Colchester. J. R. HICKINBOTHAM, M.B.

SUPPURATION IN GONORRHOEAL EPIDIDYMITIS.

IN his articles on "Diseases of the Male Urethra" Mr. Frank Kidd states that "gonorrhoeal epididymitis never suppurates," unlike that caused by the colon bacillus.[1]

While it is true that large abscesses do not form in gonorrhoeal epididymitis, unless secondary infection is present, it is nevertheless also true, as anyone who practises epididymotomy will bear out, that a few drops of pus are often present in gonorrhoeal epididymitis.

The simple operation of puncturing the epididymis with a tenotomy knife in the area of maximum pain and infiltration is an operation that deserves greater recognition than it receives. It is not to be used indiscriminately in every case, but in those in which infiltration and pain are severe and persistent. The justification for this small procedure is proved by the fact that (*a*) often a few drops of pus are evacuated, (*b*) pain is quickly relieved, (*c*) the infiltration subsides much more quickly than when conservative methods are used, and (*d*) stenosis of the vas may be obviated by timely removal of the inflammatory products under tension.

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EARLY FORMATION OF ADIPOCERE.

IN India several cases of early formation of adipocere have been recorded, especially by Coull Mackenzie (*Indian Medical Gazette*, 1889) and Major Moir, I.M.S. (Idem, May, 1897).

The accuracy of these observations has been disputed by many, notably by Dr. G. H. F. Nuttall of Cambridge (Idem, April, 1897). Waddell, in Lyons's *Medical Jurisprudence*, fifth edition, page 87, says: "It has been objected to these Indian observations that no analysis and microscopical examination of the alleged adipocere was made. Well-authenticated cases, supported by an authoritative chemical analysis, are still required to settle this question for India." Dr. R. S. Ashe recorded a case in which he sent some of the tissues to the chemical examiner, who only reported "very partial saponification had taken place"—after four days' burial and some days in transit. I was myself somewhat sceptical of the accuracy of previous observations, and in my own experience of many thousand autopsies adipocere was very rare.

The following should, however, satisfy the most critical:

Yakub Hatham, healthy male, aged 35, was assaulted and a heavy rock thrown on his back while lying at the bottom of a ditch. He died at 1 p.m. and was buried at 5.30 p.m. on September 11th, 1916, in the Mussulman Cemetery, Bombay. The soil was chiefly gravel and shale, almost at the sea level. There was an exceptionally heavy rainfall before and during the period of his burial.

His body was exhumed and I made an autopsy at 11 a.m., September 15th, 1916—three days twenty-two hours after death. There was little smell considering the decomposed aspect of the body. The stomach had ruptured from decomposition. The intestine was fairly well preserved. The spleen had

[1] BRITISH MEDICAL JOURNAL, January 13th, p. 43.

become diffluent and lay like a quantity of soft soap in the peritoneal cavity. The heart, liver, and kidneys were of a pale colour and felt soapy and greasy. The pancreas looked and felt like soap, its outline well preserved. The muscles and tissues generally were partly turned into a soapy substance which stuck to the hands. On washing the hands at a tap without the addition of soap, this substance formed a greasy lather.

Lumps of a soapy substance, weighing 210 grains altogether, were removed from the region of the cheeks and temples and submitted for analysis to Major W. H. Dickinson, F.I.C., I.M.S., professor of chemistry in this university, chemical analyst to Government. These lumps looked and felt exactly like pieces of "old brown Windsor" soap.

Parts of the substance shaken up in water formed frothy "suds" at the surface. Selected lumps almost completely dissolved in alcohol, leaving a small deposit at the bottom of the tube. No structure could be recognized with the microscope in this deposit, except doubtful portions of small arteries. The supernatant alcoholic solution formed an opaque milky emulsion on the addition of water. Major Dickinson reported: "The substance sent is adipocere."

The dates given above are definite and were sworn to at the inquest and at trials in the police court and in the high court.

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Reviews.

PROFESSIONALISM *VERSUS* ORIGINALITY.

ALL professions must be subject to rules of conduct, and such rules can only be propounded and enforced by the experience and authority derived from within. However desirable it may be from the outsider's point of view that these rules should be ignored when special circumstances arise, it has long since been obvious to the majority of thinking men that of the two evils laxity is more harmful than strictness. In a recently published work[1] Dr. HAYWARD, Inspector of Schools, has devoted his somewhat exuberant powers of inquisition to the shortcomings of professionalism as exemplified for the most part in the clerical, medical, legal, and pedagogical professions. In the second part of the book he extols the value and social importance of what he terms the "living man," by which title he indicates the man of original ideas in every walk of life.

Imbued with the absolute necessity for professional organization as the only means of maintaining and transmitting special knowledge, he runs a tilt against certain professional customs which often appear to outsiders to be mere examples of narrow-mindedness and jealousy.

If we may judge from the attacks upon medical customs, and apply the same train of thought to the other professions concerned, it is safe to infer that the writer has founded his strictures upon information derived from questionable sources. His quotations as to the doings of certain black sheep in the medical fold are derived from a work by an American writer not otherwise known to fame. A short experience of the work done under the aegis of, say, the Royal Society of Medicine, would doubtless alter the views expressed as to the moral status of the medical profession in general. Quotations from Molière, and from the writings of a well-known English author famous for the ingenuity of his paradoxical perversion of commonplace ideas, are interesting and amusing for armchair perusal, but they do not add much force to the arguments they are supposed to support. As regards the desirability of employing "living men" in various departments of public utility, the book appears to be singularly ill-timed in its appearance. Never in the history of the country has there been a more active and successful quest for men of exceptional knowledge and experience in every department of public life to take the lead in organizing our responses to the demands of the fighting forces in the field. As regards the profession with which the writer is himself familiar, his suggestions for improvement are much more practical than are those put forward for the guidance of the other great professions, of whose requirements in the way of reform he can only judge from outside evidence.

That reform is, and always will be, desirable in all human undertakings where all sorts and conditions of men are of necessity brought together, needs no emphasis, but it must be guided by practical as well as by merely theoretical considerations. Dr. Hayward's suggestions are interesting and his style of writing is amusing, but as a contribution towards the solution of a great problem they are by no means convincing.

NEUROLOGY.

EVER since the war broke out the study of gunshot wounds of the nerves has been prosecuted with great perseverance and success by the French neurologists. This fact is now again placed in evidence by a most practical and interesting book on the clinical forms of lesions of the nerves,[2] by Mme. ATHANASSIO-BENISTY of the Salpêtrière, with a preface by Professor PIERRE MARIE. It contains eighteen chapters, dealing with lesions of the various nerves of the limbs and head and with lesions of the chief nerve plexuses. The anatomical relations of the separate nerves and the various results of their lesions are set out most clearly and schematically, with numerous headings and subheadings. Excellent photographs and diagrams are supplied in large numbers. The chief points made by the writer are these: that each injured nerve has its own clinical individuality; that the vasomotor disturbances associated with lesions of the nerves are of great importance; and that these lesions often give evidence of involvement of the sympathetic nerve fibres. The book is clearly written, and contains evidence of the careful study of great numbers of cases. It is one that should be in the hands of all those who are responsible for the treatment of wounded soldiers, and to neurologists it should be indispensable. A second and companion volume is promised; it will deal with the nervous lesions themselves, their nature and their treatment.

A full and interesting account of the hysterical and reflex troubles produced by the injuries of warfare has been written by Dr. BABINSKI and Professor FROMENT.[3] Dr. Babinski, as is well known, prefers to use the term "pithiatism" in place of the word "hysteria" in describing all sorts of nervous disorders that can be cured by persuasion or suggestion. Among pithiatic symptoms he includes convulsive attacks, paralyses, contractures, tremors, choreiform movements of all sorts, disturbances of speech and respiration, disturbances of sensation; he excludes from this group, as not being curable by suggestion or psychotherapy, such symptoms as dermographism, tachycardia, erythemas of various sorts, and excessive perspiration. The bulk of the book deals with the numerous varieties of pithiatic (or hysterical) manifestations met with by the authors as results of the various traumatisms of warfare. Then follows a chapter on the pathogeny of these lesions; they are attributed to reflex action, in which term affections of the sympathetic nervous system (shown by certain vascular lesions) are to be included. Other chapters deal with the diagnosis and treatment of pithiatic lesions. The book is well written, argumentative rather than didactic in style, and fully documented. It will be read with interest by all who have to do with the protean and often intractable manifestations of hysteria seen in any of the combatant armies of to-day.

Professor ELSBERG's large and important-looking monograph on the surgery of the spinal cord and its membranes[4] is a record of his own experiences in this field, together with a moderate amount of neurological information. Part I, occupying 100 pages, deals with the anatomy and physiology of the spinal cord so far as the surgeon is interested in them, and the symptomatology of surgical spinal disease. Part II describes operations on the spine, spinal cord, and nerve roots, beginning with an account of

[1] *Professionalism and Originality.* With an Appendix of Suggestions bearing on Professional Administrative and Educational Topics. By F. H. Hayward, D.Lit., B.Sc., Inspector of Schools (L.E.A.). London: George Allen and Unwin, Ltd. 1917. (Demy 8vo, pp. 274. 6s. net.)

[2] *Formes cliniques des lésions des nerfs.* Par Mme. Athanassio-Benisty. Préface du Prof. P. Marie. Collection Horizon: Précis de Médecine et de Chirurgie de Guerre. Paris: Masson et Cie. 1916. (Cr. 8vo, pp. 233; 80 figures, 7 plates. Fr. 4.)

[3] *Hystérie-pithiatisme et troubles nerveux d'ordre réflexe.* Par J. Babinski et J. Froment. Paris: Masson et Cie. 1917. (Cr. 8vo, pp. 267; 8 plates, 26 figures. Fr. 4.)

[4] *Diagnosis and Treatment of Surgical Diseases of the Spinal Cord and Its Membranes.* By C. A. Elsberg, M.D., F.A.C.S. Philadelphia and London: W. B. Saunders Co. 1916 (Sup. roy. 8vo, pp. 330; 153 figures, three of them coloured. 21s. net.)

lumbar puncture; no mention is made of the use of either a local or a general anaesthetic before this puncture is attempted. Part III contains an account of the surgical diseases of the spinal cord and membranes and their treatment. It is clear that no expense has been spared in the production of Professor Elsberg's beautifully illustrated volume, which has all the characteristics of a practical surgeon's production.

A brief but luxuriously printed monograph on *Cerebellar Abscess*[5] has been written by Drs. FRIESNER and BRAUN, of New York. The first two chapters give an account of the anatomy and physiology of the cerebellum; particular attention is paid to the connexion between the cerebellum and the labyrinth, and the authors state that 98 per cent. of cerebellar abscesses are secondary to otitis. The third and fourth chapters deal with the etiology, pathology, and symptomatology of the condition, and have been based chiefly upon 86 cases collected from the literature since 1906. The fifth chapter contains a short account of the prognosis and operative treatment of cerebellar abscess; here, too, the authors support themselves largely on the literature of the subject. The book is well printed, and contains a number of handsome illustrations.

Dr. FRENKEL'S method of treating the ataxia in tabes dorsalis by means of simple exercises was first published in 1889. It depends upon the repetition of movements, not upon the improvement of muscular power; practice in the co-ordination of movements is the object aimed at by the author. Dr. L. FREYBERGER[6] has recently translated and modified Dr. Frenkel's book, adapting it to the requirements of medical practitioners who are interested in the details or the treatment rather than in the theoretical considerations underlying it. The book is divided into two parts. The first of these discusses the general signs, symptoms, and theory of the ataxia characterizing tabes dorsalis; no very definite conclusions are, or indeed can be, reached in this section, although it is full of interest to the physician and neurologist. The second part, occupying two-thirds of the volume, gives a full description of the various ways of educating ataxic limbs and muscles. Ample details are set out and the many illustrations are of great assistance to the comprehension of Dr. Frenkel's exercises. Little apparatus is required; a few pages at the end of the book contain some account of the treatment of various tabetic troubles with drugs. The book has no index and contains a good many misprints. It is a useful volume and should be in the hands of all practitioners of medicine who have to treat that singularly chronic nervous disease, locomotor ataxy.

THE SECOND SERIES OF THE "INDEX-CATALOGUE."

THE final volume of the second series of that monumental work the *Index-Catalogue of the Surgeon-General's Library of the United States Army* has just reached us. The history of this great enterprise has been so often told, and its value is so widely appreciated in this country, that when we say that Volume XXI of the second series is as complete, as accurate, and as clearly arranged as its predecessors, further praise is superfluous. The last volume contains also an exhaustive alphabetical list of the medical periodicals of the world, with the abbreviated titles employed throughout the *Index-Catalogue;* this alone occupies 233 pages. The catalogue itself consists, as usual, of a combined author index, and subject index. It includes more than 7,000 author titles, 2,000 subject titles of separate books and pamphlets, and more than 12,000 titles of articles in periodicals. The present librarian, Lieut.-Colonel C. C. McCulloch, jun., of the U.S.A. Medical Corps, contributes some interesting prefatory notes on the genesis, growth, and present condition of the Surgeon-General's library and its *Index-Catalogue*, which show clearly the immense service rendered to the medical profession throughout the world by the genius and industry of Dr. John S. Billings, "the principal upbuilder of the Surgeon-General's Library, and the creator of its *Index-Catalogue*," and Dr. Robert Fletcher. These two pioneers, now no longer with us, jointly devised the plan which has been followed throughout the work, and so placed medical libraries in their debt for all time.

[5] *Cerebellar Abscess: Its Etiology, Pathology, Diagnosis, and Treatment; including Anatomy and Physiology of the Cerebellum.* By I. Friesner, M.D., and A. Braun, M.D., F.A.C.S. London: W. Heinemann. 1916. (Med. 8vo, pp. 186; 10 plates, 16 figures. 12s. 6d. net.)

[6] *The Treatment of Tabetic Ataxia by Means of Systematic Exercise.* By Dr. H. S. Frenkel. Second revised and enlarged English edition, by L. Freyberger, J.P., M.D. Vienna, M.R.C.P. Lond., Barrister-at-Law of the Middle Temple. London: W. Heinemann. 1917. (Med. 8vo, pp. 218; 130 figures. 12s. 6d. net.)

NOTES ON BOOKS.

THE thirty-fifth volume of the *Medical Annual*[7] has been published, and, like its predecessors, forms an excellent encyclopaedia of recent work in medicine, surgery, and allied subjects, with special reference to treatment. In spite of the many difficulties due to the war, each section has been dealt with in a very complete and readable fashion, with a plentiful supply of illustrations. As is the case with other medical periodical publications, the war occupies a large share of the present volume, and the great output of medical and surgical writings on this subject is adequately dealt with in the various sections. The first fifty-six pages of the *Annual* are given up to a summary of therapeutical progress, while the main part of the work comprises a review of progress in medical and surgical practice, each subject being dealt with by a contributor who has followed closely the year's happenings in his own department. The remaining part is devoted to miscellaneous subjects, such as State medicine, legal decisions, and new medical, surgical, and therapeutical appliances, together with a useful directory of medical institutions, homes, spas, etc., and a list of the principal medical books and new editions published in 1916. Altogether the new volume of the *Medical Annual* worthily maintains the high standard of previous years, and the index, as usual, is excellent.

In the JOURNAL of February 24th, 1917, appeared a long review of *Le traitement des plaies infectées*, by Dr. A. Carrel and Dr. G. Dehelly, who is one of his colleagues at Compiègne. A good English translation of this work has now been made by Captain HERBERT CHILD, and published under the title of *The Treatment of Infected Wounds.*[8] Sir ANTHONY BOWLBY contributes a short introduction to the English edition, in which he expresses the appreciation of British surgeons at the front of the value of what is known as Carrel's method, which, "whenever it has been thoroughly carried out, has accomplished all that is claimed for it by its author, and it has been of inestimable benefit to thousands of patients. It has also renewed faith in antiseptic methods." Sir Anthony Bowlby insists on the need for scrupulous attention to every detail of the method, and suggests that if it is to be fairly judged no change whatever should be made either in Dakin's solution or in the tubes for instilling it.

During recent years letters have appeared in the JOURNAL from Dr. WALTER G. WALFORD on the evil influence of tight collars. In a small volume entitled *Dangers in Neck-wear*[9] he develops his views on the far-reaching effects of neck constriction. No one can question his disinterested motive, and most will agree that soft, loose neck-wear is hygienic; but we doubt whether many will be convinced that all the diseases enumerated by Dr. Walford are even remotely connected with tight collars.

MEDICINAL AND DIETETIC PREPARATIONS.

Vitamogen.

VITAMOGEN is a concentrated food for infants and invalids manufactured by Messrs. Williams and Co., 24, Holborn, E.C., and claimed by the makers to be especially rich in vitamines and organic phosphorus. Examination of a sample supplied to us showed it to contain:

Proteins (nitrogen x 6.3)	22.4	per cent.
Ash	7.42	,,
Phosphoric anhydride (P_2O_5) in ash ...	2.40	,,

Qualitative tests also indicated the presence of considerable proportions of starch and reducing sugars. The food is quite palatable, and appears to be very suitable for the purposes for which it is put forward.

[7] *The Medical Annual: A Yearbook of Treatment and Practitioner's Index.* Thirty-fifth year. Bristol: J. Wright and Sons, Ltd.; London: Simpkin, Marshall, Hamilton, Kent, and Co., Ltd. 1917. (Demy 8vo, pp. 724; illustrated. 10s.)

[8] *The Treatment of Infected Wounds.* By A. Carrel and G. Dehelly; translated by H. Child, formerly surgeon, French Red Cross, Captain R.A.M.C.(T.Y.); with an introduction by Sir A. Bowlby, K.C.M.G., K.C.V.O., F.R.C.S. London: Baillière, Tindall and Cox. 1917. (Cr. 8vo, pp. 248; 6 plates, 97 figures. 5s. net.)

[9] *Dangers in Neck-wear.* By W. G. Walford, M.D. London: H. K. Lewis and Co., Limited. 1917. (Cr. 8vo, pp. 181; 14 figures. 4s. 6d.

British Medical Journal.

SATURDAY, JUNE 23RD, 1917.

CO-ORDINATED RESEARCH IN WAR TIME.

WE have lately given a large share of the space now at our disposal to authoritative surveys of the development of British surgery at the front and on the lines of communication. This week Professor Andrewes and Dr. Dakin, undertaking a like duty on behalf of their own branches of science, sum up for us the achievements of pathology and biochemistry under the stimulus of war. It is an inspiring record of success accomplished in face of the difficulties and distractions of war time, and in the midst of an upheaval without precedent. How has this wonder come to pass? We think the answer will be found in Professor Andrewes's opening sketch of the growth of co-ordinated research in this country since 1913. Until that year "team work" in the United Kingdom was confined to independent laboratories. Institutions organized and equipped like the Lister Institute for collective investigation were few, and the excellent work they did was only loosely related to the same kind of work carried out in other centres, while the encouragement and direction given by the Government to the advancement of medical knowledge was negligible.

Important researches had, however, already been made at the Royal Army Medical College into various problems of military hygiene and pathology before the war burst upon us, and then the Medical Research Committee, set up under the Insurance Act in the preceding year, was in a position to be of the greatest service. The flexible organization of this committee enabled it to turn aside at once from the plans it had made for civilian research, and take over the collective solution of medical war problems by co-ordination of the efforts of individuals and groups of investigators.

Professor Andrewes describes the chief pathological problems met with during the war, the way in which they have been approached, and the measure of success attained. One of the first centres of joint investigation established for war purposes was the laboratory at Boulogne, presided over by the stimulating personality of Sir Almroth Wright. Cerebro-spinal fever, again, is a good instance of fruitful co-operation between the Army Medical Department and the Research Committee, centring in this case in the work, with which our readers are familiar, of Lieut.-Colonel Mervyn Gordon, R.A.M.C., at the Central Cerebro-spinal Fever Laboratory at home, and of Captain Ellis, Canadian A.M.C., with the Expeditionary Force. The latter carried on his researches in one of those outposts of investigation, the mobile field laboratory, which Sir Wilmot Herringham describes in the first of his two pithy contributions to our present issue. The enteric group of fevers has in the same way been brought under control through joint action by the Army Medical Service and the Medical Research Committee. In this matter great assistance was given, both at Oxford and at Wimereux, by Professor Dreyer, whose standardized technique for serum diagnosis has made it possible to collate the results of workers in every area.

Another instance of successful protective inoculation is that against tetanus. Thus Sir David Bruce has pointed out, in his periodical analyses of tetanus cases in home military hospitals, that, although the curative value of antitetanic serum has not been established, its protective value when administered in good time has been proved beyond a shadow of a doubt, making it one of the triumphs of preventive medicine. Sir David Bruce is chairman of the War Office Committee on Tetanus, and links up in his own person the activities of this body and of the Lister Institute of Preventive Medicine, of whose governing body he is also chairman. As was noted in our columns on May 26th (p. 696), the last annual report of the Lister Institute showed that its energies also had been diverted into war channels. It has produced immense quantities of serums and vaccines for the forces, its biochemists have studied the deficiency diseases, and, in association with the Medical Research Committee and the military medical authorities, it has engaged in continual inquiry into scientific problems arising out of the war; all this in spite of the fact that its director, Dr. C. J. Martin, and his assistant in the Department of Experimental Pathology, Sydney Rowland, were, at an early stage, taken away to serve as pathologists abroad, Lieut.-Colonel Martin with the Australian A.M.C., and Major Rowland with the R.A.M.C. in France, where, after doing most excellent pioneer work, he unfortunately succumbed last March to cerebro-spinal fever, the subject he was then investigating.

Throughout this country, and in the laboratories abroad, investigations which under former conditions might have been disjointed have now been linked up into collective schemes of research, all bearing directly upon urgent war problems. Furthermore, the lessons thus learnt will be available for purposes remote from war. It is fortunate indeed that, no matter what the motive may be that leads to its discovery, each new piece of knowledge, each fresh scientific application of a law of nature, is something laid to the credit side for the benefit of all, and may bear interest beyond the dreams of its discoverer. This is well brought out by Professor Andrewes in his review of the output of British pathology during two and a half years of war: he observes that the advance has been nearly tenfold greater than might have been looked for in ordinary times; and, although this has been due to the stress of war needs, "it represents a solid contribution to science which will be valid in the years of peace to come."

Nor has biochemistry lagged behind pathology and bacteriology in furnishing new and remarkable applications of science to the medical side of warfare. Some of the more striking achievements of this comparatively new department of research—from water purification to protection from the poisonous gases of the enemy—are set out by Dr. Dakin in his paper; and it will be noted how deftly the author passes over the large share which his own fruitful genius has borne in developing the chemiotherapy of wound infections. With regard to the lively discussions which have been carried on by exponents of the two rival schools of thought, Dr. Dakin makes a significant remark: he suggests that, in the view of some observers at least, the gulf between the so-called physiological and antiseptic methods of wound treatment is not nearly so deep as it seemed at one time, and that the results aimed at by the most competent representatives of each school have much in common. The same idea has doubtless been taking shape in the minds of many surgeons and pathologists during the

last twelve months or so, and it would be a great satisfaction to all if the gradual evolution of technique should bring together on common ground those whose differences once seemed irreconcilable. Everything points to a growing standardization in the treatment of infected wounds, based on eclectic principles.

POLIOMYELITIS.

The epidemic of acute anterior poliomyelitis which occurred during the summer and autumn of 1916 in New York State has provided much material for investigation of this disease, and the latest addition to our knowledge comes from Flexner and his colleagues at the Rockefeller Institute of Medical Research.

The discovery of the filterable nature of the virus was made almost simultaneously by Flexner and Lewis, and by Landsteiner and Levaditi in 1909. In 1913 Flexner and Noguchi discovered, and obtained in culture from the filtered virus, organisms of a peculiar type which they termed globoid bodies. These organisms have been found in the lesions of poliomyelitis both in man and the monkey. Injected into monkeys they have in several cases reproduced the disease in its typical form, and have again been recovered from the lesions so produced. The organism, moreover, has been seen in and obtained in culture from the blood of a monkey infected with the filtered virus. The cultivation of the organism from the infected tissues is an uncertain and difficult process even in expert hands. The technique is based on Noguchi's method of cultivating the *Treponema pallidum*. Once established in saprophytic form outside the body, subculture is usually a much simpler matter, but as usual in the saprophytic state the pathogenic properties of the organism tend to disappear.

Morphologically the organisms are minute globular bodies, lying in pairs, chains, or masses, varying in size, but averaging about 0.2 μ in diameter, which is only just within the limits of vision. In subculture the growth has to be carried over in considerable amount, and this must be taken into account in considering the question of carrying infection in so-called pure cultures of the globoid bodies, especially as it has been shown that the cultures, like the original virus, may preserve their infectivity for many months.

It is interesting to note in passing that the globoid bodies, as figured by Flexner and Noguchi and by Amoss, are strikingly similar to certain very small forms obtained by Hort in cultures from the blood and cerebro-spinal fluid of cases of typhus and cerebro-spinal fever and also from the blood in scarlet fever as well as in the enteric group of diseases, these minute forms bridging, in his view, the gap between filterable and non-filterable organisms. The ordinary immunological reactions of the globoid bodies of poliomyelitis as worked out by Amoss on rabbits and monkeys are very indefinite. Practically no agglutinins are obtained, and complement fixation tests are negative. Moreover, the serum of human beings or monkeys convalescent from the disease gives no results in these respects. At present we can only say that the exact relation of these globoid bodies to the disease is far from clear. Other organisms, especially streptococci, have from time to time been found in the cerebro-spinal fluid, but these apparently are only secondary invaders, which have entered through the damaged meninges.

If now we turn to the filterable virus itself and the neutralizing or immunity bodies which are formed against it in the infected animal, or human being, we are on firmer and, for the present, much more productive ground. The filtered virus used experimentally is prepared from the affected portions of the diseased spinal cord and medulla. Kept under suitable conditions, this virus has been found to retain its infective properties for as long as six years. When inoculated intracerebrally in monkeys infection is practically certain and the mortality nearly 100 per cent. When the inoculation is made either intravenously or subcutaneously, or by means of plugs soaked in virus and packed into the nasal cavity, the infection seldom reaches the central nervous system unless the meninges have in the first place been injured in some way, as, for instance, by the introduction into the meningeal sac of some substance which would set up an inflammation or irritation. The injection of normal horse serum into the theca a few hours previous to injection of the virus into the blood is quite sufficient to admit of the virus penetrating into and infecting the central nervous system. The injection of an immune serum, however, does not allow infection to take place, presumably because it is able to neutralize the entering virus. Even the injection of physiological saline will sufficiently alter the meninges to allow infection to take place. These are the conditions governing the experimental infection of the nervous system, and they are fairly clear.

In human beings the relative incidence of the disease in an epidemic is low—1.59 per 1,000 in the New York epidemic—so that it would seem that there must be strong protective agencies at work in the normal body. At present we are very far from knowing exactly what these are. There is strong evidence that the upper respiratory passages constitute the chief portal of entry of the infection. Amoss and Taylor have shown that the secretions of the normal nasal and pharyngeal mucosa have the power to neutralize or render inactive the virus of poliomyelitis. This power varies in different persons, and from time to time in the same person. It is apparently diminished by inflammation of the mucosa. The extraordinary efficiency of the undamaged meninges as a barrier against the infection of the nervous system from the blood, as demonstrated in monkeys, has already been referred to.

Recovery in poliomyelitis is accompanied by an active immunity process. The presence of the immunity substance has been detected by experiments in which the active virus has been neutralized by the addition to it of blood serum from an infected animal or human being. This neutralization may be effected *in vitro* before injection or after the infecting inoculation. The immunizing substances begin to appear in the blood by the sixth day. They are apparently not formed locally in the nervous tissues. They are formed elsewhere in the body and are carried in the blood, but they can only pass through the meningeal barrier under certain conditions. Hence it becomes a matter of the greatest importance to ascertain how these protective bodies in the blood may best be brought into contact with the infected nerve cells. It has been shown that the neutralizing bodies gain access to the central nervous system under conditions similar to those which govern the entrance of the infecting virus to that system. If immune serum is injected into the blood it does not gain access to the meningeal sac unless the meninges have been inflamed or damaged in some way. Thus, in human beings in the early stages of the disease, before the meninges are much altered, the immune bodies present in the blood may not gain access to the diseased nervous tissues; and the same is true in the late stages when the meningeal barrier has again

been built up. It has been shown that the injection of horse serum into the theca so alters the membranes that the immune bodies in the serum are enabled to traverse them and enter the meningeal sac. If we are able to administer the immune serum by the blood stream we can clearly give much larger doses, especially in children, than if we are limited to the intrathecal method alone. Thus by administering the immune serum both intrathecally and intravenously we ought to be able to ensure an abundant supply of the immune bodies reaching the injured nerve cells. It has been shown in the treatment of tetanus that the intravenous injection of the antitoxic serum gives good results (and in connexion with poliomyelitis Flexner has shown that the intrathecal injection of the immune serum is curative, in the early stages of the disease in infected monkeys), so that from all points of view both methods of administration seem to be indicated.

In a review of twenty-six cases of poliomyelitis treated with human immune serum in the recent New York epidemic, Amoss and Chesney[1] lay stress on the importance of early diagnosis. Lumbar puncture shows a marked pleocytosis of the cerebro-spinal fluid, usually over 100 cells per c.mm. There is also usually considerable increase of the globulin content. In many cases these signs of meningeal irritation precede the onset of paralysis. This is the period of the disease in which treatment offers the best chance of success, since, as was to be expected, the effect of the serum is more marked in preventing the spread of paralytic symptoms than in curing the paralysis once it is established. The bulk of these cases were treated within the first forty-eight hours after the onset of symptoms. The serum used was derived from human cases which had recovered from the acute stages of the disease. These writers consider that at least 50 c.cm. should be given in each case, partly into the theca and partly into the blood. The amount of serum to be given intraspinally depends on the age of the patient; 5 to 10 c.cm. is a fair dose for a child of 2 years, with 30 or 40 to be carried by the blood stream. In the bulk of their cases this latter was given subcutaneously, possibly partly on account of the difficulty of giving an intravenous injection in a small child. The serum from the convalescent patients was collected aseptically, tested for sterility, and used without inactivation or the addition of disinfectants. The possibility of conveying the infecting virus in the serum is not regarded as of any importance, because, in the first place, the virus has never been detected in the blood of human beings, and even if small quantities were present it would be neutralized by the amount of immune substances in the serum.

The further investigation of poliomyelitis is likely to form one of the most fruitful fields of modern research, and we look forward to the time when it will throw light on the very obscure questions of infection of the central nervous system; and more particularly on the relation of the meningeal barrier to the passage both of infective and curative substances from the blood into the central nervous system in such diseases as tetanus, cerebro-spinal fever, and, perhaps most important of all, cerebro-spinal syphilis.

[1] Reports of this and other investigations here mentioned will be found in the *Journal of Experimental Medicine*, April, 1917.

THE HEALTH OF MUNITION WORKERS.

THE Health of Munition Workers Committee, which has published so many valuable memorandums, has now issued an interim report on industrial efficiency and fatigue, embodying the results of investigations made for it by, among others, Dr. H. M. Vernon, on output in relation to hours of work; by Captain T. H. Agnew, R.A.M.C., on the health and physical condition of male munition workers; and on the health of women engaged in munition factories, by Drs. Janet Campbell and Lilian Wilson.

Captain Agnew visited a considerable number of representative factories and personally examined nearly 4,000 men and boys. He provides an elaborate table of the physical defects and illnesses diagnosed, and brings the physical condition into relation with (*a*) the hours of labour, and (*b*) the kind of work done. The most interesting point studied is the relation between length of working hours and general health. Captain Agnew found that a distinction had to be made between workers engaged before the outbreak of war and war-time recruits to industry. In the former case, the factor of industrial selection had probably operated, those employed representing, in some measure, the physically select workmen. Among men and boys engaged since the war, there appeared to be a distinct relation between length of hours and physical condition. While 22.1 per cent. of men working less than seventy hours a week were classified by Captain Agnew as below his highest standard, the percentage rose to 31.4 in the case of men working seventy hours a week or more. Of the boys, 6.7 per cent. and 10.6 per cent. respectively were the percentages amongst those working less than sixty hours and those working sixty hours or more.

The chief points which, in Captain Agnew's opinion, needed attention were: (*a*) Reduction of excessive hours, especially when bad transit facilities make a substantial addition to the effective length of the working day; (*b*) provision and improvement of canteens; (*c*) provision of adequate washing accommodation, which was usually very defective; (*d*) improvement in first aid equipment; and (*e*) the insistence on hygienic qualifications of welfare workers.

Drs. Campbell and Wilson seem, on the whole, to be more satisfied with the conditions obtaining among women workers. Most of the inspectors, they state, "were agreeably surprised at the general physical condition of the workers." At the same time, they hold that their results emphasize the importance of adequate provision for the health and comfort of the workers, and make very similar practical recommendations to those of Captain Agnew.

In reading these and other reports contained in the volume, one is struck by the appositeness of the Committee's remark that, although many witnesses entitled to speak with authority on matters affecting the personal health and physical efficiency of munition workers have given evidence before them, the witnesses, with hardly an exception, have "been unable to point to any exact data in support or in disproof of their particular views." It is indeed obvious that the Committee and its investigators are in the position of pioneers, and that the existing means of preparing and interpreting the vital statistics of industry are as rudimentary as those for judging the general sanitary conditions of the country before the days of medical officers of health and the system of collating information which has been perfected by the labours of more than two generations of officials at the Local Government Board or the General Register Office.

The Committee concludes its report by emphasizing "the need for the establishment of some permanent organization for the collection of scientific data upon

which alone can be based the right solution of many industrial problems intimately connected with the future prosperity and progress of the nation." This pronouncement should be had in mind by those delimiting the sphere of influence of the proposed Ministry of Health. Industrial health problems must of course be approached on the same broad scientific lines as any other health problems, but their solution involves various special considerations, and will need, *inter alia*, the compilation and analysis of health statistics of a specialized character, the want of which at present seriously hampers both the medical officer and the factory manager.

MALARIA IN FRANCE.

THE risk of the establishment of epidemic malaria in France, to which attention has been called on several occasions during the last couple of years, has again been considered by the Académie de Médecine. Professor Blanchard—than whom there is no more competent authority on the subject—acting on the instructions of the Under Secretary of State for Health in the Ministry of War, visited the Mediterranean coast of France last July, and reported the presence of malaria-bearing mosquitos. He also proved the presence of the bearer of yellow fever (*Stegomyia calopus*) in abundance on the French Mediterranean littoral, and even in the town of Nice. Professor Blanchard pointed out that at one time many areas in France suffered severely from malaria; that although the disease has now become rare, it has not wholly disappeared; and that there is a small focus of the disease in the valley of the Somme, and probably others elsewhere. Two species of anopheles exist in France—*A. maculipennis* and *A. bifurcatus*, both of them bearers of malaria. The fear is that the return of men invalided from Macedonia suffering from malaria, the introduction of Senegalese troops, and the importation of labour battalions from Annam and other eastern countries, may so multiply the opportunities for the anopheles to become infected that the disease will once more become established in many parts of France which have long been completely, or almost completely, free from it. Professor Blanchard said that the French troops in Macedonia had suffered much more severely than the British, the British having wisely looked upon the campaign in Macedonia as "a medical war," an expression which he quoted in the original, and described as not only picturesque but accurate. He expressed the hope that the autonomy recently granted to the French Army Medical Service may in future prevent the repetition of errors for which that service was very far from being wholly responsible. In August, 1916, and February, 1917, the Under Secretary of State issued directions to public health officials in France with reference to the precautions which should be taken in establishing hospitals or convalescent camps for men returned from malarial districts. He also consulted Professor Léger and Professor Laveran. Both Professor Blanchard and Professor Léger advised that the whole of France should be divided into areas, with a physician or zoological expert at the head of each, to study the question of mosquitos and malaria. This recommendation was made at the end of February, and a month later the Under Secretary of State appointed a commission, under the chairmanship of M. Laveran, to draw up a plan of campaign. No immediate action was taken, but it was hoped that the directors of each section would shortly be nominated. Meanwhile, however, the mosquito season is getting into full swing. The establishment by so high an authority as Professor Blanchard of the existence of *Stegomyia calopus* in abundance in certain parts of France is distinctly disquieting, and it appears that recently there was a small outbreak of yellow fever in the neighbourhood of Saint-Nazaire. It was started by certain cases occurring in a body of Senegalese troops which had not been subjected to a sufficiently minute medical examination before leaving Africa. It is assumed that the local stegomyia acquired the infection from them. At a later meeting of the Academy M. Netter sought to minimize the danger of either disease becoming established in France, mainly on the ground that malaria had died out, or almost died out, in France during the last half of the nineteenth century, but M. Blanchard adhered to the opinion that strict precautions should at once be put in force to prevent the recurrence of the disease, and that it was only subject to that condition that the risk could be considered small.

HOUSE-FLIES AND AMOEBIC DYSENTERY.

LIEUT.-COLONEL C. M. WENYON, R.A.M.C., Director of Research in the Tropics to the Wellcome Bureau of Scientific Research, and Captain F. W. O'Connor, R.A.M.C., have published in the *Journal of the Royal Army Medical Corps* (May, 1917) a memorandum issued in Egypt in April, 1916, on the important part played by house-flies in the spread of amoebic dysentery. During the acute dysenteric process only the free motile amoebae are to be found in the faeces, but as the acute symptoms abate encysted forms appear, which are passed in very large numbers; though they cannot withstand drying, they survive for a considerable period if kept moist. When one of these cysts is ingested in water or food it gives rise, under the influence of the pancreatic fluid, to four small amoebae, which grow into the adult form of *E. histolytica*, invade the tissues of the large intestine, and produce amoebic dysentery. A fly which has continuous access to human faeces will feed every few minutes and as often evacuate its intestinal contents, so that the amount of material passed though the gut of a single fly must be considerable, and within a few hours many thousands of cysts must have followed this course. Moreover, the cysts can survive in the gut of the fly for some hours, and may then be deposited. There is no entirely satisfactory means of establishing whether the cysts that have passed through the fly retain their vitality, but there is strong evidence that they do. This is afforded by the use of dilute eosin, which, it is believed, does not stain living cysts. The result of the application of this test was to show that the great majority were still alive, and therefore infective, after passing through the fly. The cysts do not withstand desiccation by a tropical sun, so that it seems improbable that dry dust can play an important part in their spread; but wind may distribute moist particles of the faeces or fragments only externally dry, or portions adhering to pieces of paper or leaves. Only a few destructive reagents were tried. Of these cresol seemed the best, and was found to be effective in the strength of 1 in 40 or 1 in 50, but it must have access to the cysts and therefore must be intimately mixed with the faeces. The flies on which the experiments were made were ordinary house-flies (Musca and Fannia), the blue-bottle fly (Calliphora), and the green-bottle fly (Lucilia); the passage of the cysts of *E. coli*, *E. histolytica*, and *L. intestinalis* was observed through all of them. Wild house-flies to the number of 200, caught at random in different localities in Alexandria, and kept without food in glass tubes, yielded evidence that they had been feeding on human faeces, for in the droppings of fifteen of them cysts of the three organisms mentioned above were found, and also the oöcyst of a coccidium and the eggs of various parasitic worms (*Taenia saginata*, *Ankylostoma duodenale*, *Trichocephalus trichiurus*, *Heterophyes heterophyes*, and the comparatively enormous lateral-spined egg of Bilharzia). All the infected flies came from near the cook-house of a hospital compound which was separated from a native village by a wall. The general conclusion is that flies must be reckoned as of very great importance in the spread of amoebic dysentery. Though it may be impossible to isolate and cure every carrier case in a large body of men,

much can be done by the careful use of fly-proof latrines and covered receptacles, and the authors believe that with an efficient system of fly and faeces destruction, and arrangements for the prevention of flies coming into contact with excreta, amoebic dysentery, as well as many other intestinal disorders, would be very materially reduced, if not entirely eradicated.

PAYMENT OF MEDICAL OFFICERS IN V.A.D. HOSPITALS.

LAST week attention was called (SUPPLEMENT, p. 139) to the fact that application for payment for service at Voluntary Aid hospitals may be made by practitioners who so desire. The manner in which the War Office has dealt with this matter appears to be far from satisfactory. As long ago as June, 1915, a special form (P 62) was issued to the commands under authority of War Office letter 24/General Number/3952 (F 2), dated June 16th, 1915. The form was headed, "Claim for Payment of Civil Medical Practitioners at established civil hospital, voluntary aid hospital, or convalescent home," the place and month to be specified. The form was to show the name and qualification of the civil medical practitioner, the dates of his employment and the number of days, the average daily number of patients, the rate of payment, and the total due to him, with the number of authority of G.O.C. in command. The form, further, had space to specify the number of civil medical staff employed, the proportion of staff desiring remuneration, and the rate paid for maintenance, if any. The form was to be signed by the superintendent or commandant and to be receipted by the civil medical practitioner concerned. It would appear that the D.D.M.S. of the command in many cases—probably in most—did not intimate the existence of Form P 62 to the commandants of the hospitals. We learn, however, that in one command a letter was sent round to all the practitioners concerned, and that as a result a sum of 10s. a day was fixed as remuneration. Subsequently Dr. Howard Marshall, as we have already mentioned, took the matter up with energy, and ultimately published a letter in the *Times*, to which we have already called attention. It is possible that many civil practitioners may still prefer to give their services gratuitously at these institutions. But it seems difficult to find excuse for the failure to inform those concerned that payment was available if claimed; the more so as many hard-worked and not over-wealthy doctors were giving their services. It is by no means certain even now what scale of payment is offered. In one command it is stated to be 2d. or 3d. a day for each occupied bed. In another, as we have said, it appears to be 10s. a day without reference to the number of beds. Dr. Marshall contends that proper attention should be directed in all the commands to the existence of Form P 62, that a proper scale of remuneration should be worked out, and that payment should be made retrospective. We commend these proposals to the War Office, with the additional suggestion that matters such as this are best worked out from the beginning in conjunction with the central bodies representing the civil profession which they concern.

INFECTIOUS DISEASE IN 1916.

THE Local Government Board has published a report[1] by its medical officer on the incidence of notifiable infectious diseases in the sanitary districts of England and Wales during 1916. This statement is the sixth complete annual record of the kind, and is based on the weekly reports of medical officers of health and of the metropolitan asylum managers. A preliminary table gives the total number of cases of the chief notifiable diseases during the year and the sickness rate per 1,000 of population, exclusive of cases among sailors and soldiers. There were 12 cases of plague, 4 of typhus, 149 of small-pox, but no case of cholera. The sickness rates from infectious disease for 1916 and the preceding five years are also set out in tabular form. Taking the rates for the whole of England and Wales, including ports, we find that the incidence of enteric fever has steadily dropped from 0.38 per 1,000 in 1911 to 0.16 in 1916; diphtheria, puerperal fever, erysipelas, and poliomyelitis show little variation during the six years. The sickness rate from scarlet fever increased up to 1914, and has since diminished. Cerebro-spinal fever incidence among the civilian population, which shot up from 0.01 per 1,000 in 1913 and 1914 to 0.07 in 1915, fell to 0.04 in 1916. It is shocking to find that of ophthalmia neonatorum there were 7,613 cases, giving a rate of 9.69 per 1,000 births, as compared with 6,806 cases in 1915. There were 348,090 notified cases of measles and German measles in 1916; the Order requiring notification of these diseases came into force on January 1st. A special report on measles, containing separate returns for measles and German measles, is now in preparation in the medical department of the Board. Sir Arthur Newsholme also gives a table showing the incidence of pulmonary and other forms of tuberculosis since these became compulsorily notifiable throughout England and Wales; this shows a steady decline. The total number of cases of pulmonary tuberculosis notified in 1912 was 110,706, giving a rate per 1,000 of 3.03; in 1916 the total number was 72,479, giving a rate of 2.10. Other forms of tuberculosis showed a less marked decline. The report also contains full statistics of infectious disease in each sanitary district.

[1] 1917. Published by H.M. Stationery Office. Price 9d. net.

"RECALLED TO LIFE."

THE first number of *Recalled to Life*,[1] the approaching publication of which we announced a short time ago, has now appeared. It is a journal devoted to the dissemination of information as to the care, re-education, and return to civil life of disabled sailors and soldiers, and is edited by Lord Charnwood, with the assistance of Mr. Everard Cotes. We learn from Colonel Sir Walter Lawrence, liaison officer War Office and Ministry of Pensions, that the new periodical has the blessing of the War Office, the Pensions Ministry, and the Joint War Committee of the British Red Cross and the Order of St. John of Jerusalem. The appeal of the journal is to those who are actively engaged in the administration of hospitals and in the conduct of local pension committees and technical institutes, and, with this object in view, each number will contain an article or articles on the treatment of some particular kind of disablement. But judging from the first number it will be, for the most part, devoted to administrative questions. The first article in it is a memorandum on the treatment of the disabled, by Sir Alfred Keogh, the French text of which was presented to the Inter-Allied Conference on the treatment and training of disabled soldiers held in Paris last month. The article brings the story of the work done in this country down to a recent date and includes an account of the general organization of pension arrangements, and a description of a modern curative workshop, together with notes upon the after-care of the blind, the problem of the deaf, and the provision of artificial limbs; as published in *Recalled to Life* it is well illustrated by photographs showing the men engaged in the workshops at the Military Orthopaedic Hospital at Shepherd's Bush. Following this is the text of an address to the conference by Sir A. Griffith-Boscawen, M.P., Parliamentary Secretary, Ministry of Pensions. Captain Basil Williams contributes a very full and authoritative article on pensions, in which, after a short historical summary, he gives details of the arrangements now brought into force. The Intelligence Department of the Local Government Board has a report on work for disabled men in France and Germany. There is also a paper by Colonel Sir Robert

[1] London: John Bale, Sons, and Danielsson, Ltd. 2s. net.

Jones, C.B., on orthopaedic surgery in its relation to the war, in which he presents the objects of that department of surgery in a manner which will appeal to the layman. Finally, there are a number of shorter paragraphs and notes, including brief accounts of the work at the Roehampton hospitals, and at Erskine House Hospital (Glasgow), both for limbless men, and lists of the facilities for special treatment and of training classes for the disabled in various parts of Great Britain. The editor invites communications from hospital visitors, members of committees, and wounded men themselves, addressed to him at 322, Adastral House, Victoria Embankment, London, E.C. 4.

HEREDITARY RETINAL GLIOMA.

DR. A. HILL GRIFFITH read an interesting paper at the annual meeting of the Ophthalmological Society last month on hereditary glioma of the retina, a very rare condition, which is of more than ophthalmological interest. After careful search of all the available literature, in which he was assisted by colleagues, he has only been able to find records of six instances of gliomatous families. To these must now be added the two cases which Dr. Griffith himself met with in his wards at the Manchester Royal Eye Hospital some years ago. In each family the disease was transmitted from the mother to several of her children. In the first family the mother had her right eye removed in infancy for a growth, and four of her six live-born children have had double glioma of the retina. In the other family the mother had her right eye removed at the age of 2½ years for glioma, and of her three live-born children two have had single glioma and one double glioma. In none of these children was there the faintest doubt as to the nature of the affection; they were all typical examples of the disease. To the scientific student of heredity these remarkable families should be of great interest, and, although transmitted glioma may not be quite so rare an event as the records suggest, it is highly desirable that all cases should be fully investigated and placed on record. Of the eight instances of which information is given, two only were cases of transmission from the father, but, as Dr. Griffith points out, the father is seldom so available as the mother when a child comes before an ophthalmic surgeon, and the fact that he has lost an eye is accordingly more likely to escape record.

EDUCATION AUTHORITIES AND PUBLIC HEALTH REORGANIZATION.

IN the course of his presidential address, on June 8th, at the annual meeting of the Association of Education Authorities—the fourth occasion on which he has fulfilled this duty—Dr. H. B. Brackenbury touched upon the relation between education authorities and the proposed Ministry of Health. Speaking of the advisability in the future of leaving to other persons some of the work now supervised by education committees and closely connected with the actual work of the schools, he drew attention to the vastness of the educational field, the extensions opening out, and the necessity for concentration of energies. Among the series of proposals put forward by the Association of Directors and Secretaries for Education and the National Association of Education Officers was one that education committees would be responsible for the discovery and treatment of disease in children and young persons from the nursery school to the day they left the continuation classes at the age of 18; that this responsibility should extend to the children of paupers under the care of guardians, and to boys and girls attending schools aided by the local education authorities; that the administration of medical benefit under the Insurance Act for youths and girls from the sixteenth to the eighteenth year of age should be taken over, and that the education authority should also assume an important part of the duty connected with employment in factories, workshops, and mines, at present discharged by the Home Office. While acknowledging his admiration for the zeal and ability of education officers, Dr. Brackenbury felt sure that no appreciable number of members of education committees would wish to have these duties and responsibilities thrust upon them. He was equally confident that in the interest of the health of the community, and of the unification and simplification of the public services concerned therewith, the very opposite policy was the right one. The care of the physical health of school children was primarily, and mainly, a health problem, and only indirectly an educational problem, however important its educational relations might be. If those now engaged in exploring the national organization for prevention and treatment of disease came to the conclusion that it was in the public interest to place all health services, including the school health service, under one administration both centrally and locally, it would be the business of educational administrators to help in bringing this about. The excellent work of the school medical officers would be no less successful if this section became an integral part of a complete and co-ordinated health organization. Many and great difficulties might have to be overcome in setting up such a scheme, and he did not suggest that under present conditions the school medical service should be transferred to the control of the public health committees now existing. He hoped, however, that education authorities would watch developments with an open mind and with due regard to the problem as a whole.

A MINISTRY OF HEALTH.

AN official announcement was made at the close of last week that Lord Rhondda had accepted the vacant post of Food Controller, and he has now taken up his new duties at Grosvenor House. With regard to the proposal for a Ministry of Health, with which he has been prominently associated, Lord Rhondda made a statement on June 18th to the effect that, before leaving the Local Government Board, he had received an assurance from the Prime Minister that in respect to this matter and to the bill relating to child welfare the position would be safeguarded. He expressed the hope that this would allay the anxiety shown in many quarters lest his retirement from the Presidency of the Local Government Board might delay these measures of health reform. In the House of Commons, on the following day, Sir William Collins inquired whether the Government had reached a decision as to the establishment of a Ministry of Health; Mr. Bonar Law replied that he was not in a position to make a statement, and Sir William Collins then drew attention to Lord Rhondda's latest utterance on the subject; upon this Mr. Bonar Law said that the Government had certainly not come to any decision that it was possible to introduce any bill this session. The position, therefore, seems even less clear now than it did a short time ago; but a guess may be hazarded that the only measure likely to come before Parliament in the near future is the original one for maternity and child welfare, out of which small proposal arose the far wider question of reorganization of the health services of the country.

AT the meeting of the Académie de Médecine in Paris on May 29th Professor Kirmisson presented a copy of the volume entitled *Notes on Military Orthopaedics*, by Colonel Sir Robert Jones, published by the British Red Cross Society, and containing the series of articles written by him for this JOURNAL. M. Kirmisson, in making the presentation, said that the volume contained judicious observations on the application of the general principles of orthopaedic surgery to the treatment of war injuries, such as

ankyloses, wounds of nerves, malunited fractures, and deformities of the feet. The operations recommended were clearly described, and the numerous diagrammatic illustrations made it easy to understand the details of each.

Medical Notes in Parliament.

The Promotion of Army Medical Officers.—In a written reply to a question by Mr. McVeagh, Mr. Macpherson said: "Promotions in the Royal Army Medical Corps, Regular, Special Service, and Territorial Force, up to the rank of major, are governed by a qualifying time period of service for each step in rank. Promotions above the rank of major are by seniority and selection. In the case of a temporary commissioned officer, promotion to captain is given after twelve months' service, and promotions to higher rank are given in individual cases as suitable vacancies arise, according to the officer's qualifications and the nature of the appointment for which such promotion is considered necessary. No differences other than those enumerated exist in the system of promotion in the different branches of the Royal Army Medical Corps." The promotions made in the special Territorial Force general hospitals, which were recently sent to France under special conditions to meet emergency, were all temporary and not considered prejudicial to the interests of the Medical Service, nor as causing injustice to other officers. The whole question of promotion generally in the Royal Army Medical Corps Territorial Force came within the purview of the Committee presided over by Mr. Churchill. In reply to a question by Sir E. Goulding, Mr. Macpherson added that the recommendations of the Committee were being sympathetically considered, and as soon as a final decision had been reached the report would be presented to both Houses with a note of the decisions. He trusted that this would be done very shortly. The Committee is concerned with promotions in the General Reserve of Officers, the Special Reserve of Officers, and with promotions in the Territorial Force.

Pensions for Officers.—Mr. Barnes, in announcing that the new Pensions Warrant for naval and military officers will be issued in a fortnight, has been able to promise that it shall operate retrospectively from April 1st.

Medical Re-examinations for Army Service.—Mr. Macpherson, in a number of written answers to questions on this subject on June 14th, said that he had no knowledge of alleged cases of disagreement between the classification shown on a man's medical history sheet and on his classification card. The proceeding was to attach to the medical history sheet a counterfoil of the classification card. This counterfoil was made out at the same time as the classification card which the man received. It was therefore extremely unlikely that mistakes were made. Figures were not yet available for the whole country, but in some localities the percentage of men who upon re-examination had been classified in A category had been low. In one district notorious for fraudulent rejection the percentage had been as high as 25 per cent. on the examinations conducted up to June 1st. All the suspected cases were called first in that area. The boards conducting those examinations were composed entirely of civilian doctors, with Territorial, or temporarily commissioned or retired presidents. They had been specially inspected by inspectors from the War Office, and their work had been reported as a model of careful examination. It is expected that a debate on the subject will take place this week.

Soldiers' Pay: Deductions during Hospital Treatment.—Mr. Pennefather inquired, on June 19th, as to grounds for the deduction of 7d. a day for maintenance and treatment from the pay of soldiers during the time they were in hospital. Mr. Forster replied that the stoppage was governed by paragraph 73 of the Allowance Regulations as modified by Army Order 25 of 1915, and Army Council Instruction 408 of 1917. No stoppage was made in the case of men suffering from wounds or disease due to service in the field. Mr. Hogge sought an assurance that a soldier in hospital from disease not due to his own fault should not be charged 7d. a day; but Mr. Forster replied he could not give that assurance. No stoppage was made when men were suffering from wounds received in action or from disease due to military service. It was within the discretion of the commanding officer, after taking all the circumstances into review, whether stoppage should be made in the cases of men suffering from diseases incurred in other circumstances. Mr. Pringle asked whether deduction occurred if a wounded man reported himself at his dépôt, and went into hospital again. Mr. Forster: It depends upon circumstances. If the man is suffering from the effects of wounds no deduction is made.

A Conscientious Objector.—Mr. Edmund Harvey asked whether Dr. J. C. MacCallum, D.P.H., tuberculosis officer for the county of Argyll, had been employed by the Home Office Committee on Employment of Conscientious Objectors, first at Wakefield and then as a labourer in the manufacture of manure; whether this employment had been terminated in consequence of a breach of workshop discipline; and whether he might not be employed, under whatever financial conditions might be imposed, on public health work. The Home Secretary said that the employment had been terminated not for one but for several breaches of discipline. The Committee on Employment of Conscientious Objectors had recommended his recall to the army. Dr. MacCallum had not applied for release to take up employment as a doctor, but he and members of his family had applied to the Home Office that he should be allowed to do ploughing and similar work for his relatives. Mr. Harvey, in a supplementary question, asked whether it was not uneconomical, in view of the shortage of doctors, to employ one in making mail bags and artificial manures. The Home Secretary replied that if application were made no doubt it would be considered.

Mentally and Physically Defective Prisoners.—Replying to Mr. E. Harvey, the Home Secretary said that the number of prisoners certified to be mentally defective during the year 1914–15 was 248, and the number during the year 1915–16 was 204. During imprisonment these persons were treated under special regulations. In each case the certificate of mental defect was sent to the Board of Control, with whom, together with the local authorities, rested the responsibility for dealing with these cases on their discharge. Sir George Cave added that, owing to the war, the number of able-bodied men received in prison had been much reduced, leaving a larger proportion, not a larger actual number, of physically or mentally weak. There had been no general increase of physically or mentally defective prisoners, and no modification was necessary on this ground in the prison method and regulations which already provided for appropriate treatment. Provision was made at all prisons for segregation and special treatment of mentally defective persons. Physically defective prisoners were employed, if fit for work, according to their capacity; if unfit for any work, they received suitable treatment in hospital or otherwise, as the medical officer directed.

Irish National Insurance.—In answer to Mr. Ginnell, Sir Edwin Cornwall stated that the total sum paid into, and the total sum paid out of, the Irish National Health Insurance Fund from July 15th, 1912, to March 31st, 1917, were £4,426,686 and £2,978,310 respectively, and the balance to the credit of the fund on the latter date was £1,448,376. The fund was under the control of the Irish Insurance Commissioners, subject to the powers of the National Debt Commissioners under Section 54 of the National Insurance Act, 1911, in which no alteration has been made. He was making inquiries as to what advances had been made for the purpose of the Housing of the Working Classes Act.

THE WAR.

CANADIAN MEDICAL LABORATORY WORK IN ENGLAND.

A CORRESPONDENT draws attention to the fact that the hygienic laboratory work of Folkestone has for more than a year been done free of cost and most efficiently by the bacteriologists of a Canadian mobile laboratory at present stationed in that town. This is, of course, in addition to their medico-military laboratory work. Besides the routine bacteriological diagnosis of diphtheria, typhoid, tuberculosis, and the examination of blood, pus, and other morbid products, the control of cerebro-spinal fever in the civilian population has formed a considerable part of the work, involving the examination of hundreds of nasopharyngeal and other specimens and laborious agglutination tests.

This laboratory was first organized as the pathological department of Moore Barracks Canadian Hospital, Shorncliffe, but the quarters assigned to it were very soon found to be too cramped for good work. It was suggested by Colonel G. S. Rennie, A.D.M.S., Canadians, and A.D.M.S. Shorncliffe District, that this laboratory should undertake all the bacteriological work in connexion with troops stationed not only in the Shorncliffe district, but also throughout the Dover area, including Dover garrison. A house in Folkestone was converted into a laboratory, and Captain F. B. Bowman, C.A.M.C., who had been in charge at Moore Barracks, placed in command. The area whose laboratory needs are supplied includes not only troops stationed within a radius of twenty-five miles, but some fifty hospitals. The staff consists of six officers and seventeen other ranks. The Levick sprayer is in use at the present time amongst a body of 2,400 men at Dover, and nasopharyngeal cultures are being made weekly from

groups of men throughout the camp; a report on the value of this method will shortly be forthcoming.

The examinations done at this laboratory include Wassermann reactions, of which 5,000 have been performed during the past year, and a report on the subject has been made to the Medical Research Committee, with recommendations as to methods, manner of keeping records, etc. During the past eight months 120 pathological specimens have been cut, stained, and reported on. A collection of interesting naked-eye specimens is also being made. Chemical and bacteriological examinations of urine, faeces, sewage, and water samples are also made.

The laboratory is also used as a training school for officers and men in pathological and hygienic laboratory work. Officers who have been trained are now scattered throughout the various war zones, as well as in many hospitals in England. R.A.M.C. non-commissioned officers and men are sent here for training, and are examined at the end of the course.

During the past year a report was made to the Royal Society of Medicine by Captain Bowman on the cause and treatment of infectious stomatitis and gingivitis among troops. A summary was published in the BRITISH MEDICAL JOURNAL at the time. This was the first report made on the subject, and 300 reprints were ordered for distribution to army medical officers, and an additional 500 reprints are to be distributed.

An accurate card index and filing system is kept of all records, so that of the 50,000 reports that have been sent out from this laboratory, any one can be found at a moment's notice. Facilities have also been arranged for original research by medical and sanitary officers, who may be sent for that purpose, whether from the R.A.M.C. or the Canadian Corps; a much appreciated piece of research work for the Tetanus Committee on wound infections is at present in progress.

HONOURS.

A SPECIAL supplement to the *London Gazette*, published on June 18th, contains a list of appointments and awards to officers, non-commissioned officers and men for gallantry and devotion to duty in the field. The list includes the following medical officers:

To be Companions of the Distinguished Service Order.

Captain Ernest Stanley Stork, M.B., R.A.M.C., attached Yeomanry.

For conspicuous gallantry and devotion to duty. He displayed untiring energy and devotion to duty in evacuating a large number of wounded under heavy fire. He set a magnificent example of courage and determination.

Captain (temporary Major) Alfred Charles Foster Turner, M.B., R.A.M.C.

For conspicuous gallantry and devotion to duty. He attended wounds under heavy fire day and night without rest. He was ever present along the line from the A.D.S. to the most advanced trenches, and on several occasions faced enemy artillery barrages in order that reserves of stretcher-bearers might reach their objectives.

Captain William Ferguson Wood, M.B., R.A.M.C. (Special Reserve), attached Hrs.

For conspicuous gallantry and devotion to duty. Under most trying circumstances and heavy fire he collected and tended the wounded without rest or food. He frequently made dangerous tours looking for wounded men.

Bar to the Military Cross.

Captain James Alwin Colville Scott, M.C., M.B., R.A.M.C., attached Durham Light Infantry.

For conspicuous gallantry and devotion to duty. He behaved with great courage and coolness in attending the wounded under heavy shell fire. For two days he worked continuously, with an utter disregard for his own safety. By his efforts he was able to ensure the rapid evacuation of the wounded, and undoubtedly saved many lives. (M.C. gazetted January 1st, 1917.)

Military Cross.

Captain William Robert Aspinall, A.M.C., attached Field Artillery.

For conspicuous gallantry and devotion to duty. He displayed the utmost courage and devotion in tending the wounded under heavy fire, assisting them to places of safety until they could be evacuated. He showed the greatest gallantry throughout.

Temporary Captain Vincent Edgar Badcock, M.D., R.A.M.C., attached Highland Light Infantry.

For conspicuous gallantry and devotion to duty. He has behaved in a most gallant manner on several occasions in attending to wounded under intense shell fire, showing an utter disregard of personal danger, and setting a splendid example to all.

Temporary Captain James Harding Barry, R.A.M.C., attached London Regiment.

For conspicuous gallantry and devotion to duty. He showed the utmost coolness and bravery in going out under heavy machine-gun fire and assisting to bring in and attend wounded men. Throughout he set a splendid example to all

Temporary Captain Bertram Henry Barton, M.D., R.A.M.C.

For conspicuous gallantry and devotion to duty. He worked continuously under very heavy fire, and succeeded in bringing in many wounded men. His devotion to duty saved many lives.

Temporary Captain Eric Biddle, R.A.M.C.

For conspicuous gallantry and devotion to duty. He showed great gallantry in supervising the removal of wounded from a heavily shelled area. By his untiring energy and disregard of personal danger he saved many lives.

Captain Richard Thompson Caesar, M.D., R.A.M.C.

For conspicuous gallantry and devotion to duty. On taking over the line, the cellars of the village were full of wounded. He proceeded with bearers to search all the cellars and organized removal of patients. Although the shelling was heavy and practically continuous, he remained all day and succeeded in clearing the village of all wounded.

Temporary Captain John Donal Carroll, M.B., R.A.M.C., attached Royal Warwickshire Regiment.

For conspicuous gallantry and devotion to duty. An observation post had been hit, he immediately went to the spot and attended the wounded, although the enemy continued to concentrate heavy shell fire on the post.

Temporary Captain James Alphonsus Conway, M.D., R.A.M.C., attached Oxford and Bucks Light Infantry.

For conspicuous gallantry and devotion to duty. He worked indefatigably under heavy fire, and by his personal attention saved the lives of a number of men. He set a fine example to all ranks.

*Temporary Lieutenant A. Yeshwant Dabholkar, I.M.S.

For conspicuous gallantry and devotion to duty. Although himself wounded, he displayed great courage and determination in tending wounded men under heavy fire. He set a splendid example to those around him.

*Temporary Lieutenant Erach Ruttonji Daboo, I.M.S.

For conspicuous gallantry and devotion to duty. He went forward at great personal risk and dressed many wounded men under very heavy fire. He was himself wounded.

Temporary Captain Oswald John Day, M.B., R.A.M.C.

For conspicuous gallantry and devotion to duty. He worked continuously under very heavy fire, and was responsible for the evacuation of a large number of wounded.

Captain Walter Elliot Elliot, M.B., R.A.M.C.(S.R.), attached Devonshire Regiment.

For conspicuous gallantry and devotion to duty. He worked continuously throughout the night tending the wounded under heavy fire. His devotion to duty saved many lives.

Captain Henry William Evans, M.B., R.A.M.C.(S.R.).

For conspicuous gallantry and devotion to duty. He showed the utmost bravery and zeal when commanding a stretcher-bearer division. He directed the bearers and tended the wounded in the open. By his exertions he secured the efficient clearing of the wounded over very long distances.

Captain Alfred George Timbrell Fisher, M.B., R.A.M.C.

For conspicuous gallantry and devotion to duty. The advanced dressing station of which he was in command was destroyed by shell fire, and, although himself severely shaken, he succeeded in forming a fresh dressing station.

Temporary Captain Frederick George Flood, M.B., R.A.M.C. (S.R.).

For conspicuous gallantry and devotion to duty. He displayed great courage and determination in tending the wounded under very heavy fire. His disregard of personal danger inspired all ranks. He has previously done fine work.

Captain Arthur Stuart Hebblethwaite, M.B., R.A.M.C., attached London Regiment.

For conspicuous gallantry and devotion to duty. He organized and trained a detachment of stretcher-bearers and supervised their operation under heavy fire. All casualties were cleared within a short time of the completion of the operations. This was due to the excellent training and example set by this officer.

Captain Ronald Lennox Henderson, A.A.M.C., attached Infantry.

For conspicuous gallantry and devotion to duty. He displayed great courage and determination in tending the wounded under very heavy fire. His devotion to duty saved many lives.

Temporary Captain Daniel Kennedy, R.A.M.C., attached Lancers.

For conspicuous gallantry and devotion to duty. He tended the wounded under very heavy machine gun and shell fire, to which he was continuously exposed. It was owing to his bravery and untiring devotion that many lives were saved.

Captain William Duncan Kirkland, Australian A.M.C., attached Field Artillery.

For conspicuous gallantry and devotion to duty. During hostile shelling two ammunition dumps were set on fire, also causing several casualties. He immediately went to the assistance of the wounded, and, regardless of heavy shell fire and numerous explosions, dressed their wounds. He has at all times set a fine example.

*Temporary Captain John Low, M.B., R.A.M.C.

For conspicuous gallantry and devotion to duty. He brought forward his bearer subdivision and established a dressing station under heavy fire, thereby relieving the regimental aid posts. He worked continuously for thirty-six hours.

Captain Gilbert Moore, M.B., R.A.M.C.

For conspicuous gallantry and devotion to duty. He was in command of the evacuation of the wounded for several weeks on an advanced front. He displayed skill in working his dispositions, and personally superintended the evacuation under heavy shell fire.

Captain William Fraser Munro, M.B., R.A.M.C.(S.R.).

For conspicuous gallantry and devotion to duty. He worked continuously for forty-eight hours under very heavy fire, and was responsible for the evacuation of a large number of wounded. He set a splendid example to all ranks.

* The names marked with an asterisk appeared in the *London Gazette* dated either March 17th or April 26th, 1917.

Captain Stanley Vincent O'Regan, A.A.M.C., attached Infantry.
For conspicuous gallantry and devotion to duty. He worked continuously throughout the day tending to the wounded under very heavy fire. He set a fine example to all ranks.

Captain John Dover Proud, M.B., R.A.M.C.
For conspicuous gallantry and devotion to duty. He worked continuously for forty-eight hours under heavy fire and succeeded in bringing in many wounded men.

Temporary Captain Arthur Wilmot Raymond, M.B., R.A.M.C.
For conspicuous gallantry and devotion to duty. He organized and led a rescue party to dig out some men partially buried by the explosion of a shell in a captured enemy gun pit. He set a splendid example of courage and determination.

Temporary Captain Arthur Paul Saint, R.A.M.C., attached King's Royal Rifle Corps.
For conspicuous gallantry and devotion to duty. He displayed great courage and determination in tending the wounded under heavy fire. His devotion to duty saved many lives.

Temporary Captain Humphrey Meigh Stephenson, R.A.M.C., attached Rifle Brigade.
For conspicuous gallantry and devotion to duty. He tended the wounded under heavy fire, and showed a complete disregard for his personal safety. He set a magnificent example throughout.

Temporary Captain James Williamson Tocher, M.B., R.A.M.C.
For conspicuous gallantry and devotion to duty. He displayed great courage and determination in attending to wounded for many hours during an intense hostile bombardment. He set a fine example to all ranks.

Temporary Captain Frank Muir Walker, M.B., R.A.M.C., attached Royal Horse Artillery (Lieutenant C.A.M.C.).
For conspicuous gallantry and devotion to duty. He has displayed the utmost gallantry and devotion to duty when under heavy fire, particularly when he went through a heavy barrage to some wounded men, and tended them in the open for an hour.

Temporary Captain Thomas Arnold Watson, M.D., R.A.M.C., attached King's Royal Rifle Corps.
For conspicuous gallantry and devotion to duty. He displayed great courage and determination in tending the wounded under heavy fire. His devotion to duty saved many lives.

Captain Hugh Alexander Wyllie, A.A.M.C., attached Infantry.
For conspicuous gallantry and devotion to duty. He tended the wounded continuously for two days under heavy fire. He set a splendid example of courage and determination.

Captain Charles Owen James Young, M.B., R.A.M.C., Special Reserve.
For conspicuous gallantry and devotion to duty. He went out under heavy shell fire and attended several wounded men in the open. He has on previous occasions shown fine disregard of personal danger in the face of heavy fire.

The D.C.M. has been conferred upon one sergeant in the R.A.M.C.; the Military Medal upon 64 non-commissioned officers and men of the R.A.M.C., and 14 of the A.A.M.C.; and the Meritorious Service Medal upon six members of the R.A.M.C., and two of the A.A.M.C.

A supplement to the *London Gazette*, issued on June 14th, announces the names of recipients of rewards for gallantry and meritorious service on the occasion of the mining of a hospital ship. Major Robert Thornton Meadows, R.A.M.C., receives the D.S.O.; the Order of the Royal Red Cross—first class—is conferred upon Miss Katherine Conway Jones, Matron of the T.F.N.S.Res.; and that of the second class upon two Sisters of the Q.A.I.M.N.S. Four men of the R.A.M.C. receive the Meritorious Service Medal in recognition of devotion to duty on the same occasion.

Mentioned in Dispatches.

The following medical officers are included in the list of medical officers brought to the notice of the Secretary of State for War for distinguished services rendered in connexion with the operations at Shaiba in April, 1915: Captain A. N. Thomas, I.M.S.; Lieutenant N. S. Jaton, I.M.S.; Temporary Lieutenant W. B. Patel, I.M.S.; Assistant Surgeon M. J. Nicholas, I.S.M.D.; and Senior Subassistant Surgeon Azhair Husain.

Corrections.

The following correction in the announcement in the *London Gazette* of January 1st, 1917, is announced: Military Cross Award—For Captain Charles Beverley Metcalfe, A.A.M.C., read Captain James Beverley Metcalfe, A.A.M.C.

The undermentioned officers granted rewards in the Honours Gazette of June 4th are now correctly described: Lieut.-Colonel Chester Fish McGuffin, D.S.O., C.A.M.C., Temporary Captain James Robertson Mitchell, M.C., M.B., R.A.M.C.

CASUALTIES IN THE MEDICAL SERVICES.

ARMY.

Killed in Action.

Major W. G. Porter, D.S.O., R.F.A.

Major William Guthrie Porter, D.S.O., Royal Field Artillery, was killed in action on June 9th. He was educated at Edinburgh University, where he graduated B.Sc. in 1898 and M.B. and Ch.B. in 1902; also studying at Berlin, Freiburg, Greifswald, and Paris, and taking the F.R.C.S. in 1906. After filling the posts of surgical tutor, house-surgeon, and house-physician in the Edinburgh Royal Infirmary, and of clinical tutor in the ear and throat department of that infirmary, he went into practice in Edinburgh as specialist on the ear and throat. He held the appointments of surgeon to the Ear, Eye, and Throat Infirmary, of surgeon to the ear and throat department of the Edinburgh Royal Hospital for Sick Children, and of aurist to the Edinburgh Royal Institution for the Education of the Deaf and Dumb. For several years past he had held a commission in the 2nd City of Edinburgh Battery R.F.A.(T.F.), in which he attained the rank of captain on February 16th, 1913. He had recently received the D.S.O. and been promoted to major.

Captain L. E. Clark, C.A.M.C.

Captain L. E. Clark, Canadian Army Medical Corps, was reported as killed in action, in the casualty list published June 15th.

Captain F. J. H. T. Frere, M.C., R.A.M.C.

Captain Frederick John Henry Tobias Frere, M.C., R.A.M.C., was killed in action, aged 27, on June 9th, while attending to the wounded in the first line trenches. He was educated at the Durham and Newcastle School of Medicine, and graduated M.B. and B.S.Durh. in 1913; afterwards he acted as house-surgeon of Newcastle Royal Infirmary. He joined the Special Reserve of the R.A.M.C. as lieutenant on August 12th, 1914, and was promoted to captain after a year's service. He served in the Gallipoli campaign, where he gained the Military Cross. His younger brother, Second Lieutenant Lionel Frere, East Yorkshire Regiment, was killed in action in September, 1915. Both brothers were well-known Rugby football players.

Captain O. Hairsine, M.C., R.A.M.C.

Captain Owen Hairsine, R.A.M.C., was killed in action on June 7th, aged 26. He was the youngest son of Mr. H. S. Hairsine, of Hampstead, and was educated at the Middlesex Hospital, taking the diplomas of M.R.C.S. and L.R.C.P. Lond. in 1914. He entered the Special Reserve of the R.A.M.C. as lieutenant on November 29th, 1913, and joined for duty on August 8th, 1914. He received the Military Cross on January 14th, 1916. He had served in the retreat from Mons.

Captain D. R. King, R.A.M.C.

Captain Douglas Reid King, R.A.M.C., was killed in action in the beginning of June. He was the son of the late Mr. John King, of Helensburgh and Cove, and was educated at Larchfield Academy and at Glasgow University, where he graduated M.B. and Ch.B. in 1914. He entered the Special Reserve of the R.A.M.C. as lieutenant on May 1st, 1913, and joined for duty on September 15th, 1914. He was mentioned in dispatches in 1915, and received the Military Cross on June 3rd, 1917.

Died of Wounds.

Captain W. A. Smith, R.A.M.C.

Captain William Alexander Smith, R.A.M.C., died of wounds received during the recent fighting. He was the son of Mr. William Smith, of Gowanlea, Hatton of Cruden, and was educated at Robert Gordon's Technical College, Aberdeen, and at Aberdeen University, where he graduated M.B. and Ch.B. in 1904. After filling the post of junior house-surgeon at the North Riding Infirmary, Middlesbrough, he went into practice at Wesham, near Kirkham, Lancashire, where he held the appointment of medical officer of No. 2 district of the Fylde Union, till he took a temporary commission in the R.A.M.C. He went to the front last February.

Wounded.

Colonel A. W. N. Bowen, R.A.M.C.
Lieut-Colonel A. E. Hodder, R.A.M.C.(T.F.).
Captain C. H. Carlton, R.A.M.C. (temporary).
Captain W. M. Cox, R.A.M.C.(T.F.).
Captain E. D. Gairdner, R.A.M.C.(T.F.).
Captain A. C. Giles, R.A.M.C. (temporary).
Captain P. Hudson, R.A.M.C. (temporary).
Captain W. B. Loveless, R.A.M.C. (temporary).
Captain A. J. McCreadie, R.A.M.C. (temporary).

Captain J. Macmillan, R.A.M.C.(T.F.).
Captain J. Marshall, New Zealand Medical Corps.
Captain H. C. D. Miller, R.A.M.C. (temporary).
Captain J. D. Milne, R.A.M.C. (temporary).
Captain O. de Muth, R.A.M.C. (temporary).
Captain J. J. Sinclair, R.A.M.C. (temporary).
Captain R. W. Smith, R.A.M.C. (temporary).
Captain C. Witts, R.A.M.C. (temporary).
Captain K. J. Yeo, R.A.M.C. (temporary).
Lieutenant F. G. Hack, R.A.M.C. (temporary).
Lieutenant A. G. H. Smart, R.A.M.C. (temporary).

DEATHS AMONG SONS OF MEDICAL MEN.

Bolster, Richard, M.C., Major Royal Artillery, elder son of the late Surgeon-General T. Bolster, R.N., killed June 4th. He resided at Meopham, Kent, joined the Reserve of Officers, R.F.A., in August, 1916, became acting major in October, and received the Military Cross on January 1st, 1917.

Dighton, Leslie Probyn, Sergeant 13th Company, 2nd Canterbury Battalion, New Zealanders, youngest son of Dr. A. Adair Dighton, Cheltenham, killed June 7th, 1917, at Messines. He was late manager Neuchatel Asphalte Company, New Zealand.

Graham, Henry Balfour, Second Lieutenant Black Watch (Royal Highlanders), younger son of Lieutenant-Colonel R. Balfour Graham, V.D., R.A.M.C., of Leven, Fife, killed May 8th, aged 23. He was educated at the Academy and University of Edinburgh, and had previously been wounded in September, 1915. His first commission was dated October 3rd, 1914.

Lewis, Cuthbert Preston, Second Lieutenant Royal Engineers, B.Sc., A.R.C.S., only son of Dr. Preston Lewis, of Brixton Hill, S.W., killed June 8th, aged 26.

Mackintosh, Donald, Lieutenant Seaforth Highlanders, aged 21, reported killed in action on April 11th. He was the only son of Colonel Donald J. Mackintosh, C.B., medical superintendent of the Western Infirmary, Glasgow, and Assistant Director of Medical Services for the Lowland Divisional area of Scotland. He was educated at Glasgow Academy, St. Ninian's, Moffat, and Fettes College. He was wounded in April, 1916, while serving with the Seaforth Highlanders. He had previously been reported wounded and missing, and at the end of May was reported as killed in action on April 11th. He was one of the officers recently awarded the V.C.; the act of heroism for which the award was made being officially recorded as follows:

> For most conspicuous bravery and resolution in the face of intense machine gun fire. During the initial advance he was shot through the right leg, but though crippled he continued to lead his men and captured the trench. In the captured trench Lieutenant Mackintosh collected men of another company who had lost their leader and drove back a counter-attack. He was again wounded, and although unable to stand he continued nevertheless to control the situation. With only fifteen men left, he ordered his party to be ready to advance to the final objective, and with great difficulty got out of the trench and encouraged his men to advance. He was again wounded and fell. The gallantry and devotion to duty of this officer were beyond all praise.

Tonking, David Wilson, Second Lieutenant (acting Captain) Duke of Cornwall's Light Infantry, and attached to the Royal Warwick Regiment, son of Dr. John H. Tonking, of Trevu, Camborne, Cornwall, died of wounds May 29th, aged 25. He got his commission on May 9th, 1915.

Watthews, Harold, Lieutenant West Riding Regiment, third son of Dr. Watthews of Holmfirth, Yorkshire. He received his commission in March, 1915, and was promoted to lieutenant in November, 1915, while still in his eighteenth year. He proceeded to France in February, 1917, and was killed in action on June 7th.

Woodforde, Hector Sidney Ridout, Private, 12th Battalion Australian Imperial Force, third son of Dr. Woodforde, of Goondiwindi, Queensland, killed February 25th. He was educated at Toowoomba Grammar School, Queensland.

MEDICAL STUDENT.

Holt, John Heber Goulburn, son of John Edward Holt, of Flixton, near Manchester, Private, Manchester Regiment, died of cerebral haemorrhage on June 7th, while training at Harrowby Camp. He was educated at Manchester Grammar School and Manchester University, where he was a medical student.

Second Lieutenant Ivan H. McCaw, Royal Irish Rifles, son of Dr. John McCaw of Belfast, has been wounded in the neck, shoulder, and right arm. He joined the Ulster Division in France in June, 1916, and took part in the battle of the Somme in July, 1916. Prior to receiving his commission he was a second year student in the Medical Faculty of Queen's University.

[We shall be indebted to relatives of those who are killed in action or die in the war for information which will enable us to make these notes as complete and accurate as possible.]

NOTES.

THE ARMY MEDICAL SERVICE AT THE ANCRE.

IN his dispatch describing the operations of the British armies in France from the middle of November, 1916, to the opening of this year's offensive on April 9th, with the victory of Arras, Field Marshal Sir Douglas Haig makes the following reference to the work of the medical service during the operations on the Ancre:

> The fighting on the Ancre and subsequent advance made large demands upon the devotion of our medical services. The health of the troops during the period covered by this dispatch has been satisfactory, notwithstanding the discomfort and exposure to which they were subjected during the extreme cold of the winter, especially in the areas taken over from the enemy.

MIDDLESEX MILITARY GENERAL HOSPITAL.

We are informed that the officer personnel of the unit authorized by the War Office to be raised at the Middlesex Hospital "Mobilization Centre" by Lieut.-Colonel Sir James K. Fowler is complete. A supplementary list has been formed from which vacancies will be filled as they arise. This list remains open. Many offers which could not be accepted have been received from men beyond the limit of age for service abroad.

Nurses and V.A.D.'s trained at the Middlesex Hospital are still required for service with this unit. The age limit is 45 years. Applications should be addressed to the Lady Superintendent, the Middlesex Hospital, W.

EDUCATIVE CONVALESCENCE FOR WOUNDED SOLDIERS.

A meeting to promote the interests of educative convalescence for wounded soldiers in the Heritage Craft Schools for Cripples at Chailey was held on June 14th at King's College, University of London. Sir A. Pearce Gould, vice-chancellor, who presided, said he knew of no place better designed than Chailey to re-establish mental and physical health. Nothing was so valuable alike to the tired and convalescent as some place which afforded a view of far-stretching country. The provision of artificial limbs was in itself of little value unless the men were taught to use them, and in this connexion the wholly important thing was not mere technical instruction, but the spirit of the men themselves. The instruction came from boy cripples, who had themselves surmounted the very infirmity with which the disabled man was newly faced; thus the teaching was infused with hope. Among the other speakers was Mrs. Scharlieb, who said that the Chailey treatment was the best means of saving disabled men from idleness and discontent, and thereby from moral peril.

England and Wales.

LECTURESHIP IN OPHTHALMOLOGY, LIVERPOOL.

MR. THOMAS H. BICKERTON, Honorary Consulting Ophthalmic Surgeon to the Royal Infirmary, has been appointed by the University to the lectureship on ophthalmology, in the place of Mr. Edgar A. Browne, who recently resigned the post. Mr. Bickerton has been asked by the Committee of the Royal Infirmary to continue his duties as ophthalmic surgeon until after the war.

CONTROL OF VENEREAL DISEASE.

The second annual meeting of the National Council for Combating Venereal Diseases was held at the Queen's Hall, London, on June 13th. Lord Sydenham presided, and the principal speaker was Lord Rhondda, then President of the Local Government Board, who brought with him a message from the King expressing satisfaction at the steady growth of public opinion in favour of the movement, and congratulating public health and hospital authorities on what they had already achieved in organizing measures for the treatment of venereal diseases. Lord Rhondda said that schemes for the diagnosis and treatment of venereal diseases had been submitted by 102 out of 145 local councils in England and Wales; the schemes submitted covered a population of 26 millions out of the total of 36 millions, and the number of councils whose schemes had been approved up to the present was 68, covering a population of 20 millions. Work had been started at fifty-two hospitals, and it was estimated that the free treatment provided at these hospitals would serve a population of about 16 millions. In the first five months of the present year 6,000 new cases had been treated in the London clinics alone, and in one of the big towns outside London 1,000 new cases had been treated. A legislative measure had recently been passed into law which rendered the treatment of venereal diseases by unqualified persons illegal. It was not a heroic measure, he said, but was intended merely to supplement the work done by the

hospitals and local authorities. Sir Alfred Keogh spoke on the incidence of the diseases in the army. This group of diseases, he said, was often spoken of as though it was peculiar to the army, because it was only in the army that it had been possible to study these diseases statistically. It was perfectly true that many years ago these diseases were more common in the army than among the civil population, but this was certainly not the case now. The admission rate in the army to hospitals in the United Kingdom for these diseases was 90 per 1,000 in 1905, and in 1913 it had fallen to 50 per 1,000; in India during the same period the admission rate had fallen from 154 to 52 per 1,000. The consequences of these diseases in impairing the efficiency of the armies in the field were still serious, and it had to be remembered that many admissions to hospitals for other complaints should really come under the heading of syphilis, which at least had aggravated the other condition. In the army in France the admission rate for these diseases now was 21 per 1,000; in Egypt 32 per 1,000, and at home 48 per 1,000. The Lord Mayor of Liverpool then described what was being done in his own city, where, he said, lectures had been given to thousands of men and women, and practically all the general hospitals had established wards for treatment. The midwives were being taken into co-operation, and if they detected a venereal condition at the birth of a child they were paid to bring the mother to the hospitals to be thoroughly treated. Fallen women in the prisons were also encouraged to go straight to the hospitals on their release, and the majority voluntarily did so. Other speakers were Mrs. Creighton and Sir Malcolm Morris; the latter declared that as a council they were opposed to the whole policy of artificial prophylaxis; the prophylaxis they believed in and did their best to support was of the moral kind.

Maternity and Child Welfare in London.

At the meeting of the London County Council on June 19th the question of delegating to borough councils certain powers and duties at present vested in the County Council, including the local control and supervision of midwives and the inspection of lying-in homes, again came up for consideration. The M.O.H. for Lewisham had prepared a scheme of local control and inspection, and the council of that borough, supported by certain others, passed a resolution in favour of delegation. The County Council, however, expressed the view in March last that, so far as powers under the Midwives Act were concerned, such delegation would not make for efficiency or economy in administration. The views of the Public Health Committee on the proposals as affecting the services with which it is concerned were not at that time forthcoming. The Public Health Committee now reported with regard to the inspection of lying-in homes and the powers under the Children Act relating to infants and young children nursed and maintained for reward that it would be unfortunate to discourage a serious attempt on the part of a borough council to deal comprehensively with this important matter, and expressed the opinion that if it were known that the Council was prepared to consider sympathetically such requests from borough councils it would be an incentive to those councils to raise their public health standard. The committee suggested, therefore, that the Lewisham Council should be authorized to act according to its scheme for one year as an experiment, all such concessions to be conditional upon a satisfactory maternity and child welfare scheme being approved by the Local Government Board and the appointment of an adequate staff for the carrying out of such a scheme. Two letters from the Local Government Board were put in, stating that the department would only grant powers of inspection of midwives and lying-in homes to local sanitary authorities which had satisfactory schemes of maternity and child welfare; as the Lewisham Borough Council had such a scheme and had appointed the necessary staff for carrying it out, it seemed that it would be an advantage to delegate powers in this case. The Midwives Act Committee of the County Council adhered to its opinion against delegation, and in view of this difference between the two executive committees concerned, the Council, to avoid controversy, agreed to the postponement of further consideration until after the war, when a definite reply will be given to the Lewisham and other borough councils which have approached the County Council on this matter.

Scotland.

Medical Bureaux in Edinburgh.

THE Edinburgh Panel Committee has resolved, with the full approval of the Scottish Insurance Commissioners and the Burgh Insurance Committees, to establish a system of medical bureaux throughout the city in order that the medical needs of insured persons left without their doctors may be fully met. Down to May, twenty-eight out of a list of eighty-two insurance practitioners resident in the city area, with a panel list of over 23,000 insured persons, were on military service. These were attended by a certain number of doctors, the arrangements being made partly by the doctors themselves before leaving and partly by the Panel Committee. This method worked fairly well, though some of the doctors were undoubtedly overtaxed. When, however, another ten insurance doctors, making a total of over 46 per cent. of the available doctors, with a further panel list of 15,000, were called up, it was felt that the present system could not go on any longer, and that something more must be done to meet the emergency. After full consideration it was then decided that a system of bureaux should be set up at once, whereby a more equal distribution of the extra work could be carried out without putting undue strain on any individual doctor, and thus avoiding the risk of further depletion by the breakdown of some of the older men here and there.

Arrangements have been made to open three bureaux on Monday, July 2nd—a Central at 12, Archibald Place, an Eastern at 4, Dalziel Place, London Road, and a Western at 8, Henderson Terrace, Dalry—for consultations each evening, and for the receipt of messages for visits. The bureaux will be staffed by a number of experienced women clerks who will undertake all the clerical work. Provision is made for the receipt of night messages by the caretaker at the Central Bureau, and telephone facilities have been generously granted by the chief constable and firemaster at the various police and fire stations. The consultations will be given by a rota of doctors, two at each bureau, their turn being once a week, so far as it can be arranged. It is hoped that by the hearty co-operation of the doctors involved in doing their share in this emergency measure, and by strict attention to the necessary rules on the part of insured persons, the administration of the bureaux will run smoothly and be a complete success.

Curative Workshops.

The orthopaedic department of the First Scottish General Hospital, Aberdeen, is established at Oldmill, and now provides 250 beds. This total, it is announced, is to be increased at an early date to 500. The institution has a massage and electrical department, and a medical officer in charge of each. The *Scotsman* announces that the electrical equipment and the equipment for movement exercises is now practically complete, that a new ward of 50 beds has recently been opened, and that an installation of whirlpool baths is shortly to be set up. The curative workshops are already in full operation. The men are, if possible, put to work at their old trade, though a certain number are being instructed in new crafts where the nature of their injury interferes with the resumption of their former trade. It is hoped to utilize the services of a number of disabled men in outdoor work, such as gardening and nursery work. The appeal for funds for equipment of the orthopaedic department has met with a generous response in the districts of Scotland served by the institution at Oldmill, but further subscriptions are desired. They may be sent to the honorary secretary of the branch of the county or city in which the subscriber lives, or to the treasurer of the fund, Mr. William Smith, Canada House, 201, Union Street, Aberdeen.

THE eighth Pan-American Medical Congress will be held in September, 1918, in Buenos Aires.

Correspondence.

QUO VADIS?

Sir,—I have recently received two communications—one headed National Health Insurance and the other Doc. 19 of the Insurance Acts Committee; the former purported to be an account of what our Association has done for panel practitioners in the past, the latter gives reasons, and very convincing ones, for prophesying the approach of a fight every whit as strenuous as that of 1911, to meet which the first document gives something more than a sketch of the Association's plan of campaign, which may be briefly described as a strike, though it is disguised under the name of a general refusal on the part of insurance practitioners to renew their contracts.

The only tangible fact I can find as to the work of the British Medical Association for panel practitioners is that the effort of the Association succeeded in obtaining one and a half million of extra remuneration, and the irony of the situation as it turned out was that this extra remuneration was sufficient to cause the defeat of the avowed and official policy of the Association, which was "that work under the Insurance Act is derogatory to the honour and interests of the profession," through its sufficiency to tempt the weaker brethren to break their pledges, but it was not enough to salve the "honour and interests" of those who accepted work on the panel, for they have been dissatisfied with their lot ever since they worked under the Act.

I now wish very earnestly and seriously to put two questions to every member of our Association.

Question No. 1: If the solemn pledges of 1911 were cast aside on a little monetary temptation, will not the pledges given in the next fight be cast aside with equal facility in the hour of temptation? The only possible answer I can see is "Yes," unless the Association can guarantee the givers of the pledge against monetary ruin.

Question 2: Is it probable or even possible (under our constitution) that our Association can be in a position (*a*) to advocate a strike and (*b*) to support the strikers while on strike? The answer to (*a*) seems to me to be in the negative, but our legal adviser might be able to give a more certain reply. The answer to (*b*) seems to me also to be in the negative, judging by the experience of the 1911 fight.

Out of all this or beyond it comes the further consideration whether we wish to see the British Medical Association converted into a trade union, for nothing short of a trade union with trade union discipline and freedom from the law can ensure obedience to pledges and money enough to support a strike. I understand that panel practitioners have one if not two trade unions registered as such, and surely the advocacy and support of a strike is the business of such a union, and not of the British Medical Association.—I am, etc.,

London, W., June 19th. Fred. J. Smith.

THE CO-ORDINATION OF BRITISH MEDICAL POLICY.

Sir,—As an active and loyal member of the British Medical Association, it gives me great pleasure to read the letter from Dr. Gordon in the Journal of June 9th. It shows that a spirit of organization and reconstruction is abroad, and that the profession are realizing the necessities of the situation. It also shows that there are others beside myself who recognize that the Association is not sufficiently equipped for the coming struggle.

Dr. Gordon admits that the Association is "unsatisfactorily organized." He expresses the belief that "the Association . . . will fail us again," and yet he avers that "we must rely on the British Medical Association." Many, very many, in the profession will subscribe to all this. Hence the growth of what he terms "certain (much smaller) associations." He then proceeds to suggest remedies of a screwing up or patching nature to enable the Association to cope with the "intrigues of interested politicians." Before commencing hostilities it is imperative that we should discover the character of the enemy, and nothing can be clearer than his own words, namely, intrigues of politicians interested in the security of their own positions (he cannot mean that they are interested in ours). Now I had the honour recently to head a deputation to a member of Parliament responsible for a Government department. As we were leaving the room this gentleman said: "You are quite right, gentlemen, to organize upon a trade union basis. I am a politician myself, and I can tell you that the only argument which carries any weight is the question of *votes*." Herein is the weakness and the cause of "failure" of our Association. It cannot influence a parliamentary election in the slightest degree. If it were to attempt to do so its charter would bring down on it certain grave disabilities. Yet we are told that unless it can influence the elections it will fail as before.

What, then, is the answer to the riddle? No internal reorganization will compensate for the want of physical force, which, as Dr. Gordon admits, is the basis of trade unionism. This, then, is the answer: A separate medical trade union should be formed (in fact, is formed), and this union should take up the fight at the point where the Association begins to fail. This union will then, with its funds protected by the Trades Union Acts, step into the political arena, take its place on all the political platforms all over the country, provide fighting funds and fighting men in every constituency to oppose non-sympathetic candidates or support favourable ones, turn every doctor's surgery into a political committee room until the politicians are compelled to recognize that here at last is a force that will have to be reckoned with. This is political action in contradistinction to the old methods of resolutions and memoranda. Dr. Gordon admits we must fight politically. Does he realize what this means? Does he contend that we are to enter the political arena less well equipped than our opponents?

He somewhat pathetically talks of "sympathetic collaboration" on the part of the Legislature. Does he really suppose that Parliament, as now constituted, cares one jot about an "association of cultivated persons," or would pay the slightest attention to their representations in the face of the pressure from lay trade unions and friendly societies who can affect the votes?

I thoroughly agree when he says that we must rely upon our great Association, but I would not rely on it alone.

By all means let the Association "purge itself of trade unionism." The rise of other associations gives it the opportunity to do so. Let it plume itself upon its "scientific and social position," but let it beware lest in the coming struggle it will find itself without heavy artillery. It should therefore encourage and co-operate with a union which is able to supply what it evidently lacks, and which it seems unable or unwilling to provide for itself. There is great need for *two* associations.—I am, etc.,

Hampstead, June 12th. W. Coode Adams.

Part-time State Medical Service.

Sir,—I think that attention ought to be drawn to the scheme of part-time State medical service so ably outlined by your correspondent, Dr. G. E. Haslip, in the Journal of June 2nd, p. 747. If by adoption—say at the next Annual Representative Meeting in July—some such policy could be presented as that of the British Medical Association, we should be in a strong position to assist the new Ministry of Health by upholding the legitimate financial claims of the profession and at the same time carrying out the noblest aspirations of medical science—namely, the provision of means for securing the continued welfare and happiness of the English nation.—I am, etc.,

Hove, June 17th. W. Ainslie Hollis.

AUXILIARY HOSPITALS IN SCOTLAND.

Sir,—In the article on military hospital economies published in your issue of June 16th you draw attention to the position of the existing auxiliary military hospitals, and express the view that they need further efficient inspection, so as to obviate several drawbacks which you consider are due to the present system of management.

I cannot speak from any personal knowledge of the English hospitals, but I can say most confidently that the criticism levelled against them does not hold good as regards our Scottish Auxiliary Red Cross hospitals. All of these have been established by the Scottish branch of

the British Red Cross Society with the approval of the Scottish Command, and are all known as Auxiliary Red Cross hospitals. There are no V.A.D. hospitals in Scotland, but V.A.D. members serve in them, as well as in the military hospitals.

I have just returned from visiting thirty-three of these auxiliary hospitals in the North-East of Scotland, and I am satisfied, and I believe the Scottish Command is also satisfied, that the patients are not kept in them too long, that there is a regular visitation of all the cases over thirty days, and that the patients in them are well fed and economically so. In the district I refer to the hospitals carry on their work at a grant of 2s. per day in the majority of the cases. Few are given the 2s. 6d. grant, and in two cases only is 3s. a day paid. In the two latter the extra sum has been sanctioned because of special hospital treatment that is being given.

As regards the staffing of the Scottish Auxiliary Hospitals, I am satisfied that if this is looked into it will be found that none of them keep any medical men from active service, and that they are attended by medical men who are either over military age or are considered necessary for work in the district. A very regular system of visitation has been arranged, and is carried out from the central hospitals.

Further, in Scotland the country has been divided into four districts, and for each of these a Commissioner has been appointed, whose duty is to take charge of the auxiliary hospitals and report regularly to the Scottish Command about them. Three of the Commissioners are medical men, and in the case of one district, where the Commissioner is not qualified, a Medical Assistant Commissioner has been appointed. This system has been found to work well, and I am convinced that only suitable cases are sent to each hospital, that the trivial cases are discharged as soon as possible to Command dépôts or to their own dépôts for return to the army, and that by means of the cards issued with each patient the treatment started in the central hospital from which the patient has come is continued. Any patients not making satisfactory progress are suitably dealt with, and cases requiring any special treatment, orthopaedic or otherwise, are at once transferred to centres where this can be carried out. Speaking generally, I am of opinion that our Scottish Auxiliary Hospitals are playing a very useful and important rôle in the care of the sick and wounded, and that they would emerge satisfactorily from any inquiry.—I am, etc.,

GEORGE THOS. BEATSON, M.D.,
Chairman, Scottish Branch B.R.C.Soc.

Glasgow, June 19th.

*** Sir George Beatson has sent us a copy of the Commissioner's weekly statement on Red Cross work in the North-Eastern District of Scotland, containing a letter dated June 17th, 1917, from the A.D.M.S. of the Eastern District, who, at the end of his week's tour of inspection of the Red Cross hospitals in the N.E. district, records his high opinion of their excellent management. "Where there are so many hospitals the conditions naturally vary, some being better than others, but in all cases a very high standard of excellence has been maintained. The staff is capable and attentive." In conclusion, he asks the Commissioner to convey to all concerned his "appreciation and admiration of the excellent work done in this area in the interests of the soldiers, and of the high degree of efficiency that prevails."

THE GRIEVANCES OF TERRITORIAL MEDICAL OFFICERS.

SIR,—I have read the letter of "O.C." in the BRITISH MEDICAL JOURNAL of June 2nd, but I do not see how his suggestion would work. He says that if his suggestion were adopted, "captains would obtain their majorities at the end of nine years' service, and majors be promoted lieutenant-colonels at the end of twelve years' total service." It is laid down in T.F. Regulations, para. 102, that lieutenants will be eligible for promotion to captain after three and a half years' service, and captains will be eligible for promotion to major after eight and a half years' service *as captain*—that is, after twelve years' total service. I see how "O.C.'s" scheme would accelerate the promotion of captains to major by three years, but I fail to follow him when he says, "majors would be promoted lieutenant-colonels at the end of twelve years," because promotion to lieutenant-colonel is rather different. "There will be a fixed establishment of lieutenant-colonels. Promotion to this rank will be by selection to fill vacancies from majors who have qualified" (T.F. Regulations, para. 102); "have qualified" meaning, have passed Examination D. (written) (T.F. Regulations, para. 281).

Promotion before this war was practically on the same footing for all R.A.M.C. officers, whether they were Regular, Special Reserve, or Territorial, and it is a trifle difficult to see any very good reason why the "temporary" officer should be "pushed up" more rapidly; he did no soldiering before the war, why should he then be selected for special favour now? The other suggestions in "O.C.'s" letter are reasonable.—I am, etc.,

June 10th. TERRITORIAL FORCE.

SIR,—The leading article in the JOURNAL of June 9th on the "Position of the Territorial medical officer who is *à la suite* of a Territorial general hospital" correctly represents the belief of the officers concerned.

Members "in the field" who get their JOURNALS will welcome any reference to the R.A.M.C.(T.F.), for they are treasuring the hope that the Association is still holding a brief for their interests. It will be within the recollection of all that in September, 1914, these officers were invited to offer themselves for general service, and many willingly, and at great personal sacrifice, sent in their names, and were accepted for such service.

Letters have been published in the JOURNAL from time to time which have raised the hopes of Territorial medical officers that something would be done with regard to their promotion; and they are hoping that the Association will use its influence and organization in this direction, for there is no question about there being a good cause of grievance.

Let it be remembered that:

1. These officers were originally selected from distinguished members of the profession (Para. 75, T.F.Reg.).
2. Some of them have been in France for between two and three years.
3. They are men of considerable experience.
4. Some have given up everything, even to the selling of their practices, in order to devote themselves entirely to their country.
5. They are of the same rank as men who, obtaining a commission as early as possible, have been qualified only one year.
6. There is no captain in the Regular R.A.M.C. of a date earlier than 1909.
7. When they were given their commissions as captains they were eligible for promotion to the rank of major after eight and a half years' service (Para. 102), this paragraph being amended in January, 1916, to twelve years.
8. Although otherwise eligible for higher positions they find themselves passed over, and see officers otherwise their juniors given these positions.

The Territorial officers R.A.M.C. are looking to the British Medical Association to do all in its power to obtain some satisfactory solution to this question of promotion.

It may not be possible nor to the interests of the service to promote all; but surely preferential treatment might be given to those who have given up everything and have been in France for, say, over two years, and have been original members of their units?

Nor would this adversely affect those members of the same unit who are doing duty at home, for those in the field are presumably out for the duration of the war; and some have even given up their residences in the area of their units.—I am, etc.,

June 13th. A LATE REPRESENTATIVE.

*** If our correspondent will refer to the SUPPLEMENT of May 19th, p. 116, he will find the text of an additional memorandum submitted by the Naval and Military Committee of the Association to Mr. Churchill's Committee pointing out that there was a widespread feeling that Territorial medical officers do not receive the sympathetic treatment they deserve and making a series of specific suggestions. Among the suggestions made was one

having reference to the promotion to the rank of major of those who prior to the outbreak of war held the rank of captain in the R.A.M.C.(T.F.) and another recommending that there should be a representative on the staff of the Director-General A.M.S. specially to deal with the questions affecting Territorial medical officers. On June 13th, 1917, Colonel J. Raglan Thomas, V.D. (late A.M.S., T.F.), accompanied by the Deputy Medical Secretary, appeared before the Departmental Committee on Promotion and gave evidence in support of the memorandums already submitted to the Committee by the Association (see SUPPLEMENTS, March 17th, 1917, and May 19th, 1917). The various points put before the Committee were very favourably received, and it is hoped to publish a fuller note on the matter at an early date.

INTRAVENOUS INJECTIONS OF TARTAR EMETIC IN MALARIA.

SIR,—Immediately after reading Sir L. Rogers's account of the treatment of malaria with intravenous injections of tartar emetic,[1] we tried this method on six cases of malaria—three of benign tertian and three malignant. In none was any diminution in the number of parasites, gametozoa or schizonts, apparent. In one—benign tertian—the number of gametozoa was greatly increased. In none was the course of the fever favourably affected.

In the first case the initial dose was half a grain. In the remaining five cases we began with 1 grain (0.08 gram). This dose usually caused severe headache with a feeling of fullness in the head.

As with Low and Newham, our cases resulted in disappointment, and astonishment that one in Sir L. Rogers's position should have published his preliminary report on such scanty evidence. In a case of rat-bite fever we gave three doses of 1 grain (0.065 gram) of tartar emetic on alternate days with no improvement. The symptoms cleared off after two doses of salvarsan.—We are, etc.,

A. POWELL, B.A., M.B., M.S.,
Professor of Medical Jurisprudence, Bombay.
F. D. BANA, M.B., M.R.C.S., D.P.H.,
Medical Officer, Wadula Dispensary, B.P.T.

Bombay, May 11th.

WAR EMERGENCY FUND
OF THE ROYAL MEDICAL BENEVOLENT FUND.

SIR,—We beg to support the urgent letter of appeal to this Fund which appeared in the last week's medical journals.

This Fund was instituted by the Royal Medical Benevolent Fund last year to afford assistance to members of the profession who, in consequence of having joined the Army Medical Service, find themselves in temporary difficulties.

We very strongly commend the claims of this Fund to the generous support of both the profession and the public.—We are, etc.,

FREDERICK TAYLOR,
President, Royal College of Physicians.
W. WATSON CHEYNE,
President, Royal College of Surgeons.
W. H. NORMAN, Surgeon-General, R.N.,
Director-General of the Medical Department of the Navy.
ALFRED H. KEOGH,
Director-General, Army Medical Service.
WILLIAM OSLER,
Regius Professor of Medicine, University of Oxford.
T. CLIFFORD ALLBUTT,
Regius Professor of Physic, University of Cambridge.
JOHN TWEEDY,
Past-President, Royal Medical Benevolent Fund.

11, Chandos Street, Cavendish Square, W.1, June 16th.

CHLORINATED WATER AND TRENCH NEPHRITIS.

SIR,—In his *Materia Medica*, Lauder Brunton, referring to the action of large doses of p tassium chlorate, given medicinally, says that it produces "haematuria with blood casts and diminished secretion of urine, many of the renal tubules being filled with plugs of blood"; and Allbutt and Rolleston refer to a "toxic haemoglobinuria produced by chlorate of potassium."

These conditions are well known. Is it not possible that the "trench nephritis" that has become so prevalent amongst our men at the front is due to some analogous action by the calcium hypochlorite used in sterilizing the drinking water? I have suspected this for a long time and would be glad of any suggestions.—I am, etc.,

Brighton, June 14th. W. A. CHAPPLE, Major R.A.M.C.

[1] BRITISH MEDICAL JOURNAL, January 6th, 1917, p. 6.

The Services.

FLEET SURGEON ROBERT H. NICHOLSON has been awarded a Greenwich Hospital pension of £50 a year in the vacancy caused by the death of Deputy Inspector-General Alfred W. Whitley.

Surgeon-General W. R. Edwards (I.M.S.), C.B., C.M.G., has been appointed an Honorary Physician to the King, vice Surgeon-General Sir Benjamin Franklin, K.C.I.E., deceased.

Universities and Colleges.

UNIVERSITY OF CAMBRIDGE.

THE following candidates have been approved at the examinations indicated:

THIRD M.B.—*Part I (Surgery and Midwifery)*: H. R. Bickerton, A. J. Copeland, E. T. D. Fletcher, H. Gainsborough, A. R. Jennings, J. B. S. Lewis, A. H. Pearce, S. Riddiough.
M.C.—A. M. Zamora.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.

AN Ordinary Council was held on June 14th, when Sir Watson Cheyne, President, was in the chair.

Diploma of Fellowship.

Diplomas were issued to three candidates found qualified at the recent examination.

Licence in Dental Surgery.

Diplomas of the Licence in Dental Surgery were granted to sixteen candidates found qualified at the recent examinations.

Tribunal Concerning Pensions.

Mr. Bilton Pollard was elected to serve on a tribunal which it is proposed by the Ministry of Pensions to set up for the consideration of appeals by discharged disabled soldiers and sailors with reference to the grant of gratuities in place of pensions.

Vacancies on the Council.

A meeting of the Fellows will be held at the College on Thursday, July 5th, for the election of three Fellows into the Council in the vacancies occasioned by the retirement in rotation of Mr. W. Harrison Cripps and Mr. V. Warren Low, C.B., and by the death of Sir Frederic Eve. The following are the candidates: Mr. Cripps, Mr. Low, Mr. H. B. Robinson, Mr. H. B. Grimsdale, Mr. F. J. Steward, Mr. James Sherren, and Fleet Surgeon P. W. Bassett-Smith.

Vacancy on the Court of Examiners.

The President reported that Mr. L. A. Dunn's term of office on the Court of Examiners would expire on the 25th of July next, and that the vacancy thus occasioned would be filled up at the Ordinary Council on July 26th.

Examiners in Anatomy and Physiology for the Fellowship.

The following were appointed for the ensuing year:

ANATOMY.—R. W. Reid, G. Taylor, W. Wright, W. H. Clayton Greene.
PHYSIOLOGY.—G. A. Buckmaster, J. B. Leathes, H. W. Lyle, F. A. Bainbridge.

Examiners under the Conjoint Examining Board.

ELEMENTARY BIOLOGY.—W. G. Ridewood, G. P. Mudge.
ANATOMY.—J. E. S. Frazer, A. Thomson, F. Wood Jones.
PHYSIOLOGY.—C. M. Hinds Howell, G. A. Buckmaster.
MIDWIFERY.—H. R. Andrews, C. H. Roberts, J. S. Fairbairn, G. F. Darwell Smith.
PUBLIC HEALTH.—*Part I:* J. W. H. Eyre. *Part II:* F. N. K. Menzies.
TROPICAL MEDICINE AND HYGIENE.—*Bacteriology:* J. W. H. Eyre. *Diseases of Tropics:* C. W. Daniels.

AT the second medical convention recently held at Pernambuco it was stated that the annual mortality from tuberculosis in that city is 66 per 1,000, a rate greater than that of all other preventable diseases combined. The Pasteur Institute, which was founded in 1899, has up to the present successfully treated 3,340 persons bitten by rabid dogs; the annual average is about 200.

Obituary.

WE regret to announce the death of Dr. W. BEZLY THORNE, which took place in London on June 11th. He studied at St. Bartholomew's Hospital, and qualified in 1869; soon afterwards he started practice in South Kensington, a neighbourhood which was just then becoming fashionable. He soon acquired a very large connexion through his energy, skill, and charming personality. He took the degree of M.D.St.And. in 1888, and became M.R.C.P.Lond. in 1891. About this time he introduced the "Nauheim" treatment of diseases of the heart and circulation into England, and soon had so large a special practice that he gave up general practice and eventually settled in Harley Street, where he remained, practising as a physician and specializing in cardiac complaints, till his death. He was only ill for a few days, remaining at work almost to the last. His family was intimately connected with the medical profession. He was a brother of the late Sir Richard Thorne Thorne, K.C.B., Medical Officer to the Local Government Board in England, and had two other brothers and four nephews in the profession—all of these, with the exception of one, were students of St. Bartholomew's Hospital.

DR. WILLIAM HALL CALVERT died on June 16th in a nursing home in London in his 57th year. He was the son of the late Rev. Wm. Calvert of the United Presbyterian Church, North Berwick, and received his medical education at the University of Edinburgh and Vienna. He graduated M.B., C.M.Edin. in 1882, and M.D. in 1889. He had contributed several papers to our columns, including those on epidemic jaundice as a sequelae of influenza in 1894, on diversity of action on the pupil and eye accommodation of morphine and atropine in combination when administered by the mouth and hypodermically in 1895, and on the treatment of caries near elbow and wrist-joints without excision or amputation in 1896. He was the author of *The Further Evolution of Man* and contributed an article on Darwinism to the *Westminster Review* in 1911. While in practice at Melrose he held the appointments of parochial medical officer, medical officer of the Infectious Diseases District Hospital, and medical officer of the Post Office. He took great interest in the work of the British Medical Association, and had served the office of secretary of the South-Eastern Counties Division of the Edinburgh Branch from the reconstitution of the Association in 1902 to 1908.

INSPECTOR-GENERAL ROBERT BENTHAM, R.N., who died recently at Ealing, aged 70, received his medical education at University College, London, and took the diplomas of L.R.C.P. and S.Edin. in 1868. He joined the medical service of the Royal Navy, and reached the rank of Deputy Inspector-General in September, 1901; he served at the Plymouth Hospital from 1902 to 1904, and was in charge of the Malta Hospital from 1904 to 1907; he retired in March, 1907, with the rank of Inspector-General of Hospitals and Fleets. He was formerly the representative of the Royal Naval Medical Service on the Central Council of the British Medical Association.

DR. WILLIAM LE PAGE, who died recently at his residence in Guernsey, was the son of Mr. William Le Page, and was born in 1841. After a preliminary education at Elizabeth College he studied at the University of Durham, and took the diplomas of L.R.C.P.Edin., L.R.F.P.S.Glas., and L.S.A. in 1876. He was a surgeon lieutenant-colonel in the Royal Guernsey Militia, and had held the offices of surgeon to St. Peter Port Hospital and the Castel Hospital, and physician to the Castel Lunatic Asylum.

DR. ALEXANDER HUTCHISON MCCRACKEN, of Falkirk, died suddenly on June 8th, aged 52. He was a native of Kilcreggan, and was educated at the University of Glasgow, where he graduated M.B., C.M. in 1892. He started practice in the south of Scotland, but removed to Falkirk over twenty years ago. He was a member of the Stirling Branch of the British Medical Association.

MR. ALFRED WINKFIELD, of Oxford, who died suddenly on May 3rd, was a student at St. Bartholomew's Hospital, and took the diplomas of L.S.A. in 1860 and F.R.C.S.Eng. in 1869. In his early days he was a keen cricketer and an excellent lawn tennis player. He held the post of M.O.H. for Oxford from 1872 to 1892, when he was succeeded by the present occupant, Dr. Ormerod. He was honorary surgeon to the Radcliffe Infirmary, and in 1902 the University of Oxford conferred the honorary degree of M.A. upon him. He had been unwell for a week before his death, but he had been out on the day previous.

Medical News.

SIR E. COOPER PERRY, physician to, and superintendent of, Guy's Hospital, has been elected Vice-Chancellor of the University of London, in succession to Sir Alfred Pearce Gould, who has held the office for two years.

DR. A. F. STANLEY KENT, professor of physiology in the University of Bristol, will open a discussion on fatigue and alcohol, at a meeting of the Society for the Study of Inebriety, at 11, Chandos Street, Cavendish Square, W., on July 10th, at 4 p.m.

MISS FAY LANKESTER, Secretary of the National Health Society, 53, Berners Street, London, W., has published a leaflet on after-war professions for women, in which she points out the excellent openings offered to well-educated and well-trained women by public health work. Special training for this career is arranged by the National Health Society, the course of instruction lasting from four to six months.

ON June 18th the Secretary's Office, Ministry of Pensions, was removed from Great George Street, to Westminster House, Millbank, S.W.1, to which address all correspondence should now be sent. There will be no change in the addresses of the offices of the Ministry at Chelsea Hospital, S.W.3 (Award of Soldiers' Pensions); 45, Grosvenor Road, S.W.1 (Widows and Dependants); and 33, Baker Street, W.1 (Issue Office).

AS already announced, the Baby Week organized by the National Baby Week Council will be held from Sunday, July 1st, to Saturday, July 7th. The Queen has consented to be patron, and to open the exhibition at the Central Hall, Westminster, on July 2nd, at 2.15 p.m. At 3 o'clock that day there will be a meeting of health workers at the Guildhall, to which Her Majesty will send a message. On July 3rd a mass meeting for mothers will be held at the Central Hall, Westminster, and on July 4th conferences on the present position of midwifery work in urban and rural areas. On July 5th Judge Neil, of Chicago, will address a mass meeting in the same place. On July 6th the annual conference of the Parents' National Educational Union will take place at Bedford College, Regent's Park. On July 7th there will be an infant welfare competition. The exhibition will remain open from Tuesday to Saturday between the hours of 10 a.m. and 10 p.m.

THE total number of students of medicine in the five universities of Switzerland during the winter semester 1916–17 was 1,901. They were distributed among the several universities as follows: Bâle had 215, among whom were 12 women; there were 47 foreign students, of whom 2 were women. Berne had 411, among whom were 45 women; there were 168 foreigners, of whom 29 were women. Geneva had 512, of whom 110 were women; there were 333 foreigners, of whom 90 were women. Lausanne had 248, of whom 35 were women; there were 97 foreigners, of whom 23 were women. Zürich had 515, of whom 89 were women; there were 182 foreigners, of whom 42 were women.

AT the annual meeting of the Society for the State Registration of Trained Nurses, held on June 7th, with Mrs. Bedford Fenwick, the president, in the chair, Major W. A. Chapple, M.P., gave an address on the general position with regard to the Nurses' Registration Bill, of which he is in charge. He said that there were now no opponents of the principle of State registration, and even the leaders of opposing interests realized that the reform was bound to come. Before medical registration, the condition of things in the medical profession had been as chaotic as it was in the nursing profession at the present time, and the general community was just as indifferent. State registration would bring about a great change in the nursing profession; the whole curriculum of training would be altered. A resolution was passed unanimously endorsing the action of the central committee in insisting on the direct representation of organized societies of

nurses on the professional governing body defined by the Nurses Registration Bill, and thanking the Committee for keeping faith with these societies in regard to this principle during its negotiations with the College of Nursing. The society has received from America a message from the National League for Nursing Education, expressing appreciation of its aims and efforts and approval of the principles for which it is contending.

THE Executive Committee of the British Science Guild has published its eleventh annual report. The important work undertaken by the Guild has been noted in these columns on several occasions. During the past year the committee has observed many signs of awakened interest in the national significance of scientific method and work. Until the war compelled attention to be given to all matters affecting national efficiency little heed was paid to the warnings of those who foresaw the consequences of the neglect of science by the State. The British Science Guild now has the satisfaction of noting an increased demand by responsible bodies for the co-operation of science with industry, education, and administration—a reform which the Guild has urged for the past twelve years. Thus the Royal Society has set up a conjoint board of members of scientific societies; a committee on the neglect of science in the public schools at the senior universities and in examinations for public services has been formed; and an education reform council, with representatives of science and industry and commerce as well as of education, has been brought into being. The board of scientific societies formed by the Royal Society sent a deputation to Lord Crewe, as chairman of the committee of the Privy Council for scientific and industrial research in December last, and learnt that the Government had decided to form a new department for this work (BRITISH MEDICAL JOURNAL, May 12th, 1917, p. 635). The medical committee of the Guild, of which Sir Ronald Ross is chairman and Sir Alfred Keogh deputy chairman, found its work during the past year somewhat impeded owing to the absence of many of its members on war service, but several meetings were held. The eleventh annual meeting of the Guild was held on April 30th, 1917, at the Mansion House, when Lord Sydenham delivered to the large audience an interesting address on national reconstruction.

Letters, Notes, and Answers.

AUTHORS desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Office, 429, Strand, W.C.2, on receipt of proof.

THE telegraphic addresses of the BRITISH MEDICAL ASSOCIATION and JOURNAL are: (1) EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology, Westrand London;* telephone, 2631, Gerrard. (2) FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate, Westrand London;* telephone, 2630, Gerrard. (3) MEDICAL SECRETARY, *Medisecra, Westrand London;* telephone, 2634, Gerrard. The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin.

The address of the Central Medical War Committee for England and Wales is 429, Strand, London, W.C.2; that of the Reference Committee of the Royal Colleges in London is the Examination Hall, 8, Queen Square, Bloomsbury, W.C.1; and that of the Scottish Medical Service Emergency Committee is Royal College of Physicians, Edinburgh.

☞ *Queries, answers, and communications relating to subjects to which special departments of the* BRITISH MEDICAL JOURNAL *are devoted will be found under their respective headings.*

QUERIES.

DR. JOHN DRUMMOND (Liverpool) asks for suggestions as to treatment in a case of poker spine in a man 30 years of age. The disease first showed itself in January, 1915, with pains and stiffness in the legs. The back is now immobile. There is no pain except during efforts to bend. The upper part of the spine is flexed forward, with decided flattening of the chest; the breathing is abdominal. There is some slight stiffness in the right hip-joint, otherwise, beyond some muscular wasting, there is nothing abnormal in any of the limbs. No history of gonorrhoea or syphilis.

INCOME TAX.

R. G. N. writes: "Having earned and unearned income, both of which added together leave me in a position to claim abatement, which portion of income would the claim come under?"

*** The point is specifically dealt with in Section 19 (2) of the Finance Act, 1907, which provides that the abatement must be set against the earned income first, and our correspondent can therefore claim against the unearned income only in respect of the excess—if any—of the appropriate abatement over his earned income.

A. V. C., writing from France, explains that his practice is being conducted by practitioners "who see the patients at their own homes, and to whom I pay a certain rate." Can he deduct from his receipts anything for the cost of maintaining his residence in his absence?

*** The matter is not free from difficulty, and there may, therefore, be some difference in practice in different localities. On the whole we incline to the opinion that it could not be maintained that any appreciable portion of the cost is incurred in maintaining property occupied in conducting the practice. But at the same time there is a good deal to be said for the contrary opinion, for example, that for the maintenance of the practice as a distinct entity a recognized practitioner's house and "brass-plate" is necessary. Our correspondent might do well to place the facts before his local surveyor of taxes, and urge the above reason in support of his claim.

GAUZE PLUGGING.

FIFTY writes: I am at present on a hospital ship. There are four other medical officers besides myself. Wounded men are received on the ship in France and conveyed to England. On the way many of the wounds have to be dressed. Some wounds are extensive, and without exception they are plugged with gauze. An orderly and I spent over half an hour on one occasion dressing one man's wounds. This was due to the difficulty of getting the gauze out of the wounds. The patient suffered much pain during the process in spite of a liberal use of hydrogen peroxide. Surely some better method could be devised. My fellow medical officers complain. We think perforated celluloid or gutta percha tissue might be put next the raw surfaces. We would be glad of suggestions and opinions.

ANSWERS.

THE LAST ILLNESS OF FREDERICK THE GREAT.

C. E. M.—Frederick the Great was attended in his last illness by Christian Gottlieb Selle, the leading Berlin physician of the day. Theden, Frese, and other army doctors were at hand, but he does not seem to have consulted any of them. The King suffered from gout, and in January, 1786, asthma, dropsy, erysipelas, and obstinate insomnia supervened. Selle was called in, and from the first regarded the royal patient's condition as desperate. Frederick lost faith in him, and dismissed him on June 4th. He then invited Johann Georg Zimmermann, author of the once famous treatise on solitude, then court physician (to our George III) at Hanover, to visit him. Zimmermann was no more successful than Selle, but the King's illness was beyond the power of physic, and it was aggravated by an inordinate appetite for highly spiced foods, which he indulged without restraint. On July 10th Zimmermann left Berlin. On August 16th the King's condition became so much worse that Selle was sent for by express, and remained till the end, which came on the morning of August 17th, 1786.

LETTERS, NOTES, ETC.

"THE DAILY GRAPHIC" AND ASYLUMS FOR THE INSANE.

DR. R. H. STEEN, Medical Superintendent of the City of London Mental Hospital, near Dartford, Kent, writes: For some time past the *Daily Graphic* has been publishing articles vituperating public asylums and every one connected with them. On June 13th this newspaper prints a long article, entitled "Heroes in Asylums." Nearly one-half of this is taken up with the correspondence of a person who writes: "I have been detained by the Lunacy Commissioners ever since December, 1905, as a lunatic." Further on it states that a patient was visited by a *Daily Graphic* representative, who we must suppose is an expert, and who could find nothing the matter except "twitching of the nerves (*sic*) and a highly-strung manner which is typical of nervous patients." This kind of nonsense is read by many, and if no reply is made the public naturally say that "silence is consent." Writing to the *Daily Graphic* has been tried, but the paper does not seem to believe in the principle of *audi alteram partem*, as the letter is not inserted. I am writing therefore to crave the indulgence of your columns and to state that the article in question contains numerous inaccuracies, to put it as mildly as possible. In the *Times* on the same day a coroner is reported to have stated that it was a scandal that so many insane patients were discharged from asylums.

SCALE OF CHARGES FOR ADVERTISEMENTS IN THE BRITISH MEDICAL JOURNAL.

	£	s.	d.
Seven lines and under	0	5	0
Each additional line	0	0	8
A whole column	3	10	0
A page	10	0	0

An average line contains six words.

All remittances by Post Office Orders must be made payable to the British Medical Association at the General Post Office, London. No responsibility will be accepted for any such remittance not so safeguarded.

Advertisements should be delivered, addressed to the Manager, 429, Strand, London, not later than the first post on Wednesday morning preceding publication, and, if not paid for at the time, should be accompanied by a reference.

NOTE.—It is against the rules of the Post Office to receive *poste restante* letters addressed either in initials or numbers.